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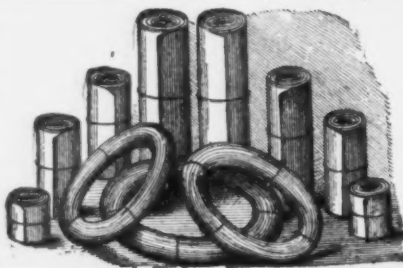
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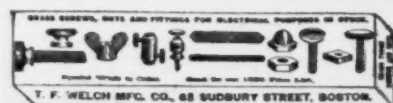
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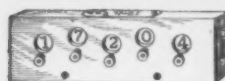
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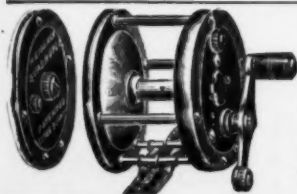
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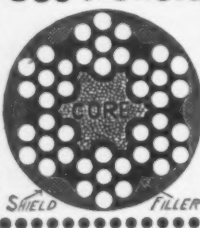
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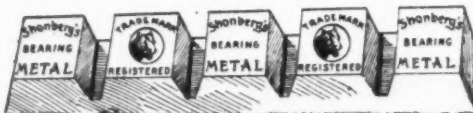
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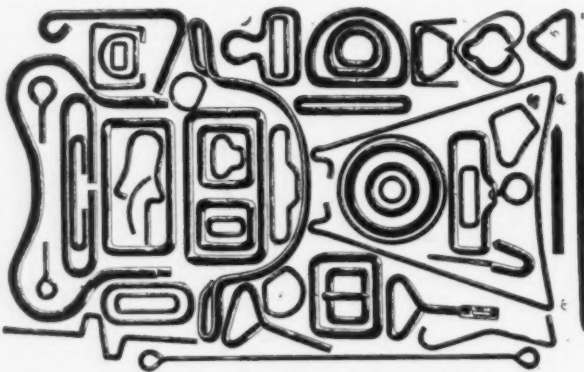
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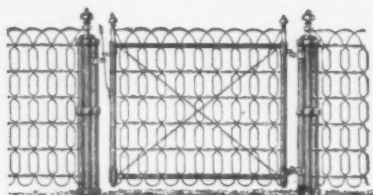
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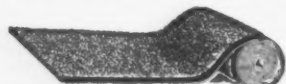


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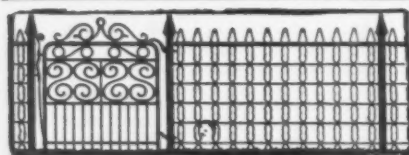
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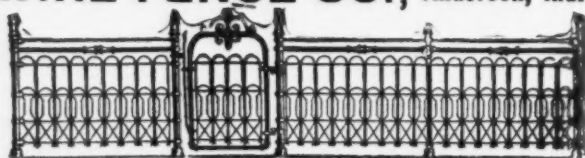
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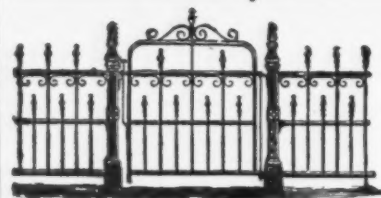
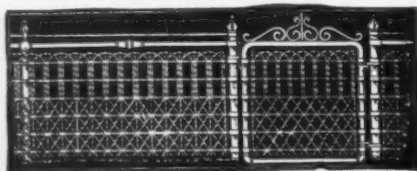
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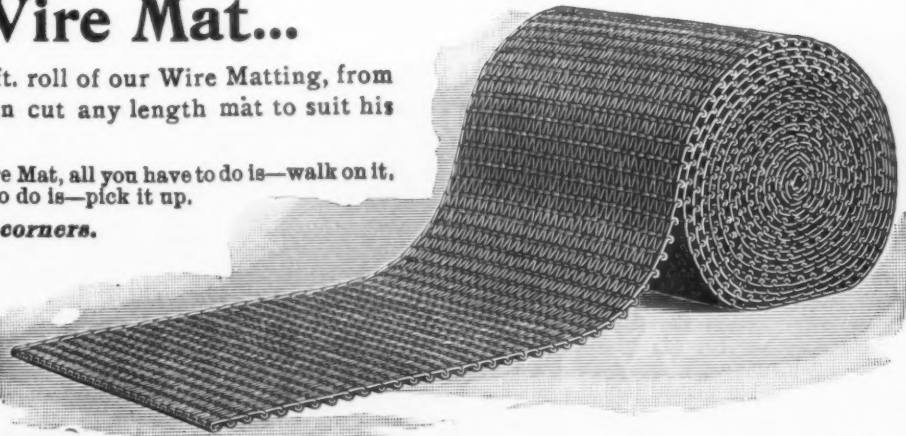
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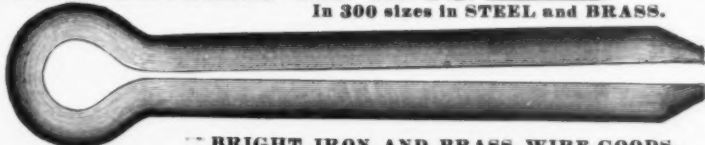
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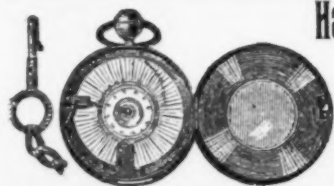
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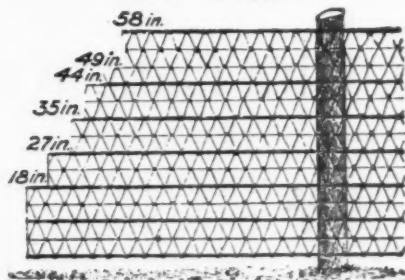
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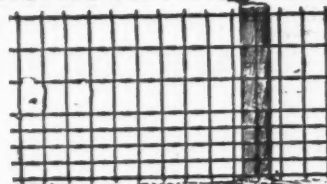
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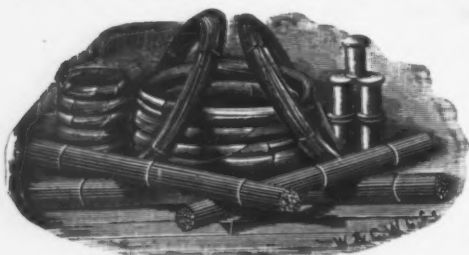
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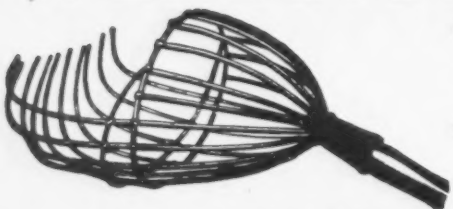
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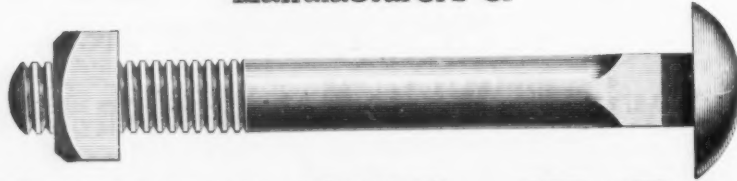
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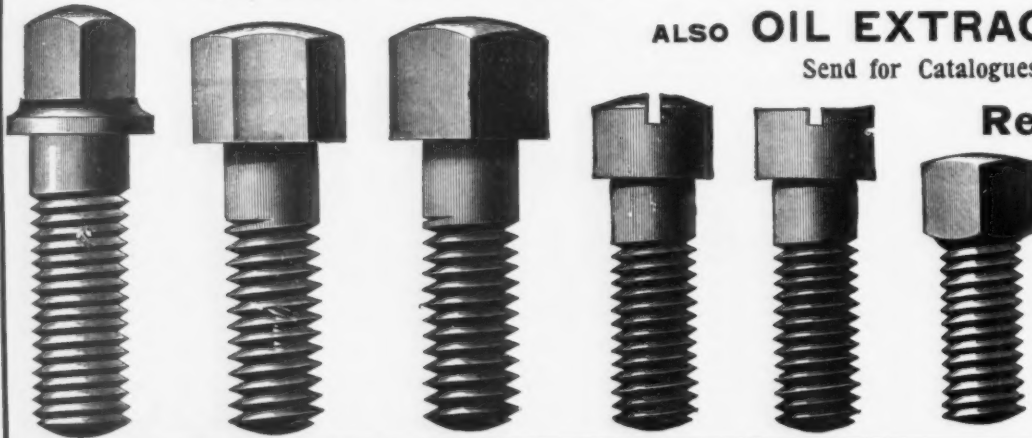
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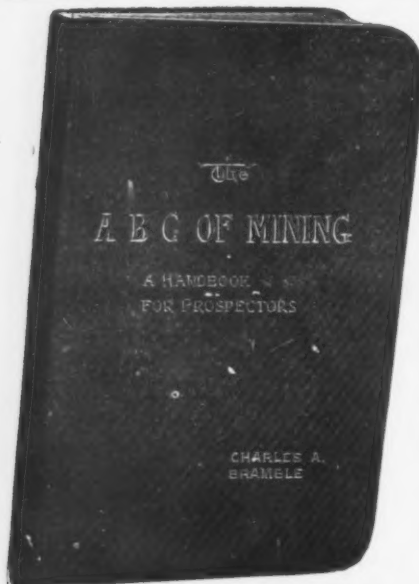
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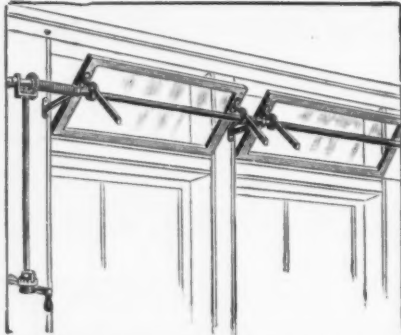
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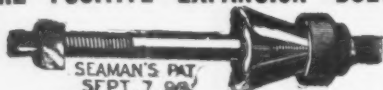
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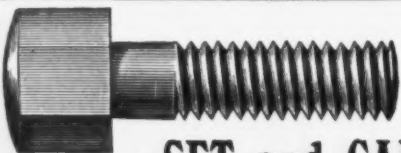
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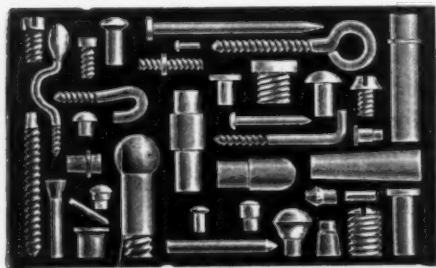
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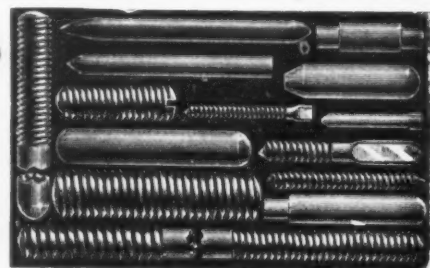


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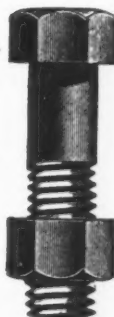
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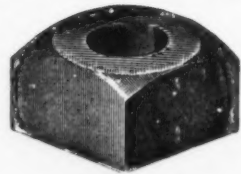
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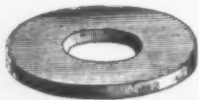
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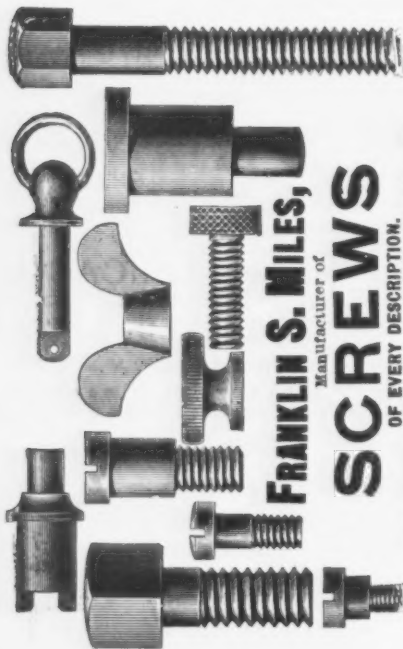
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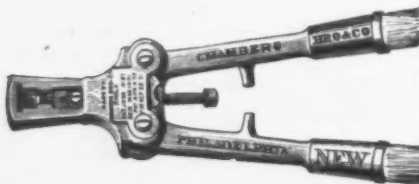
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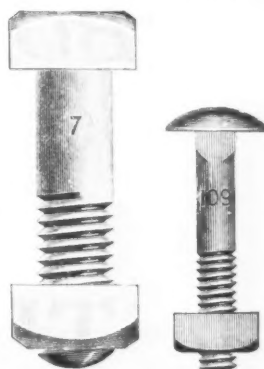
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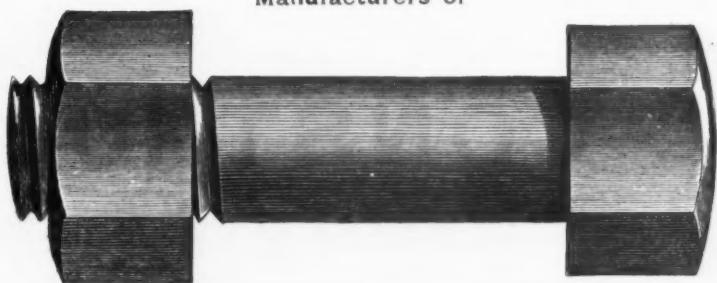
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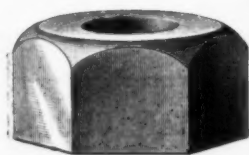
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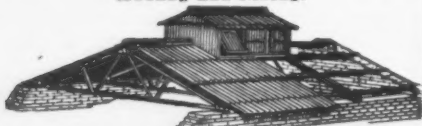
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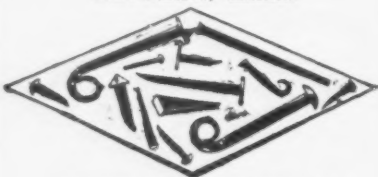
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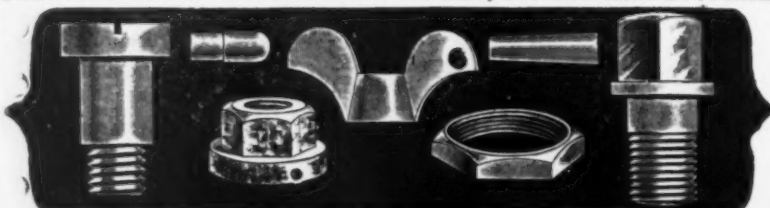
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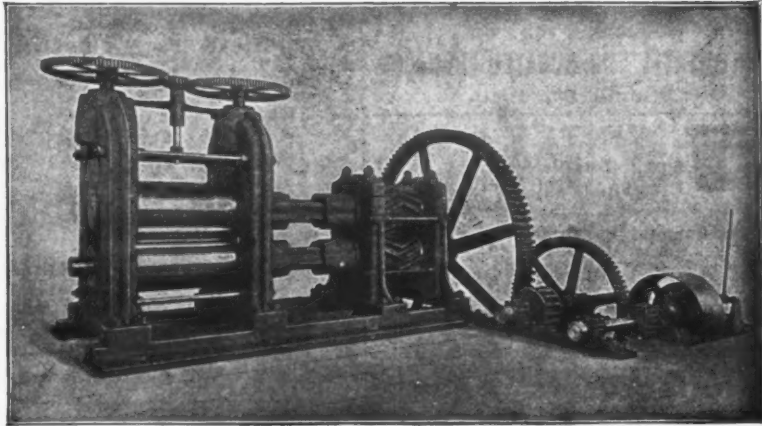
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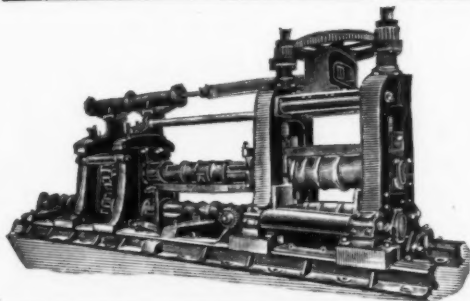
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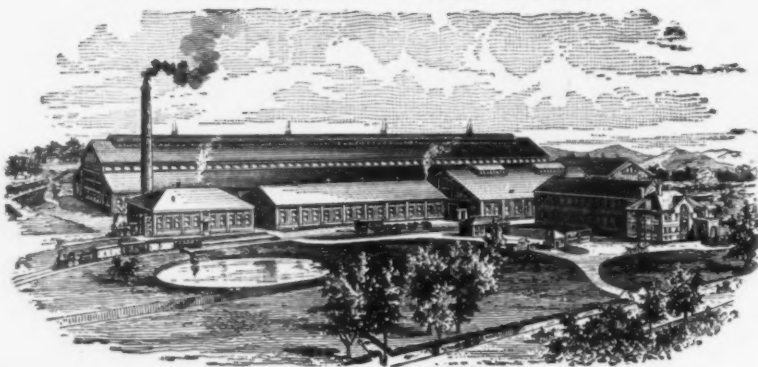
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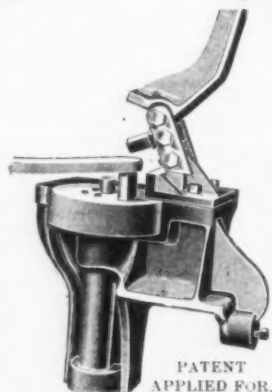
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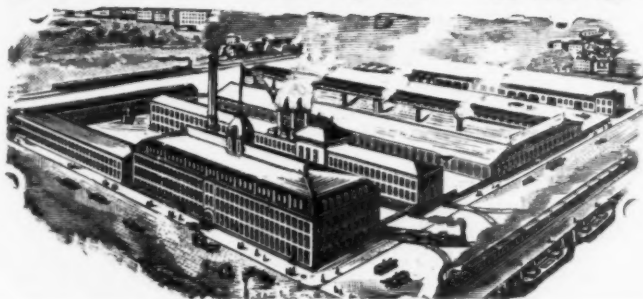
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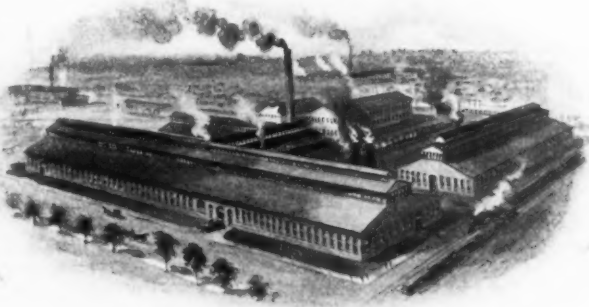
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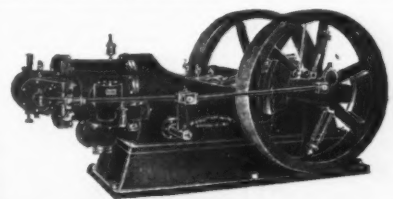
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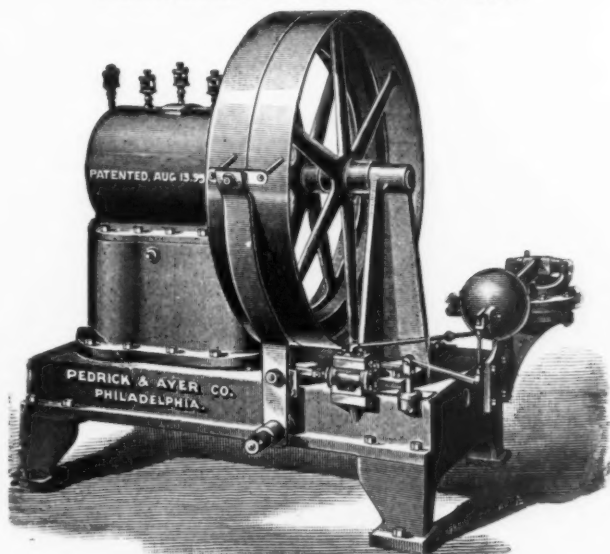
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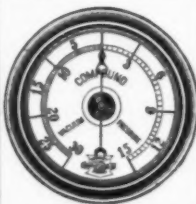
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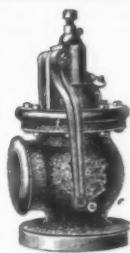


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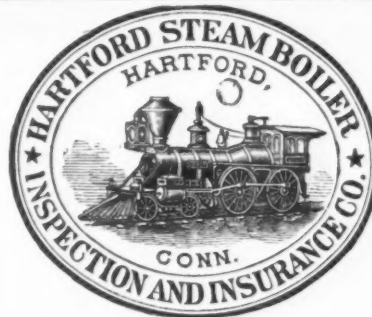
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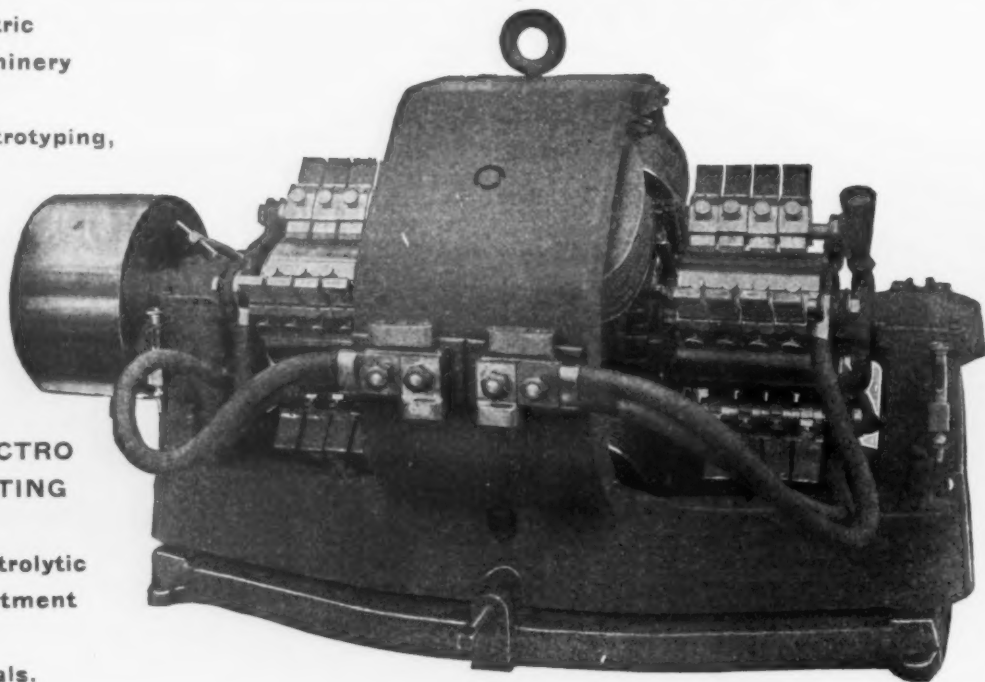
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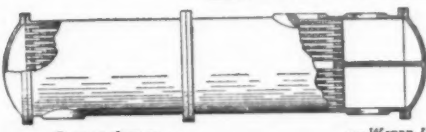
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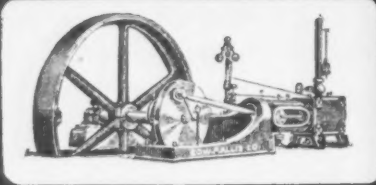
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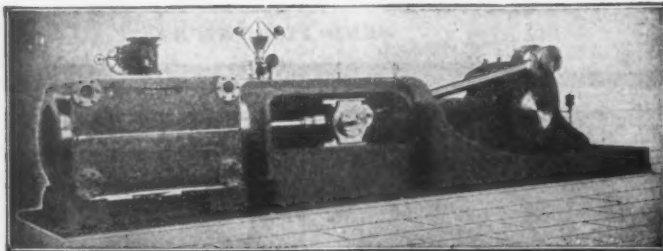
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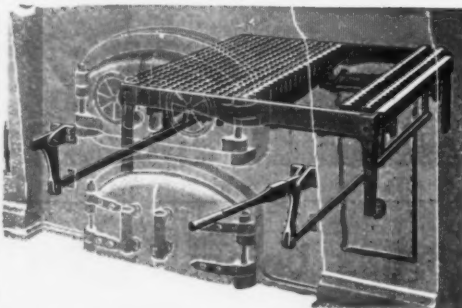
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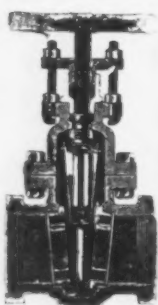
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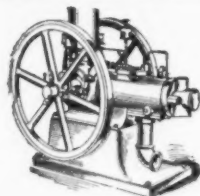
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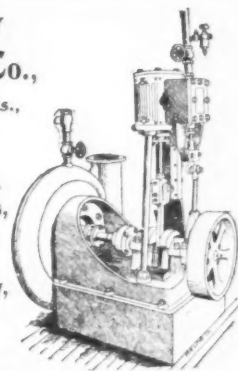
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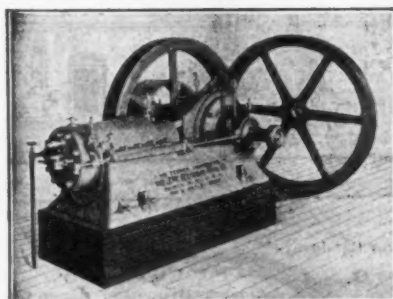
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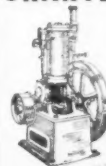
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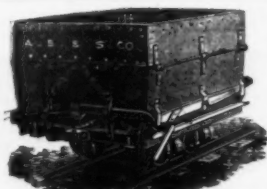
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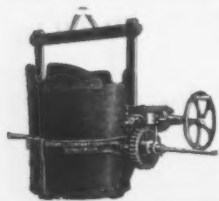
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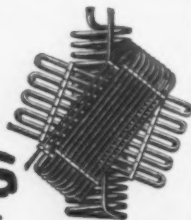
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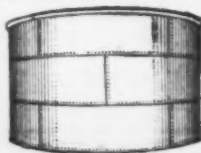
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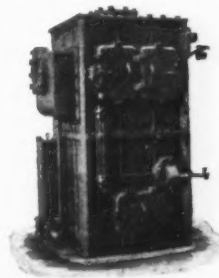
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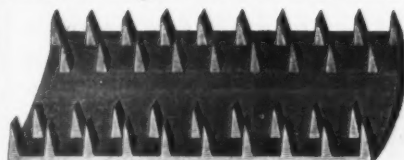
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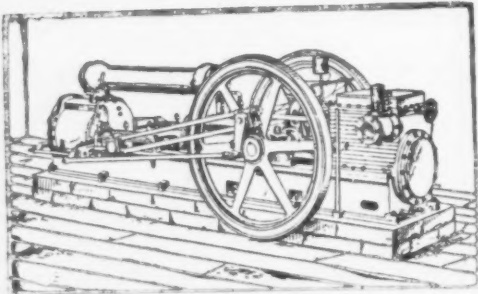


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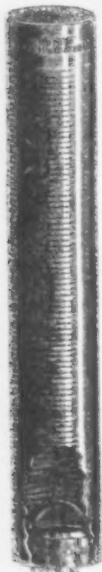
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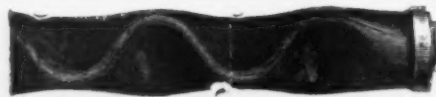
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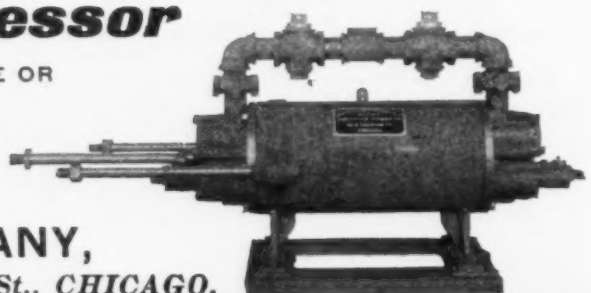
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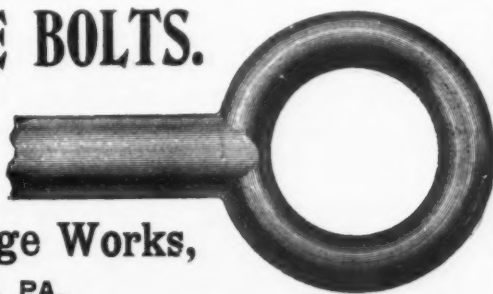
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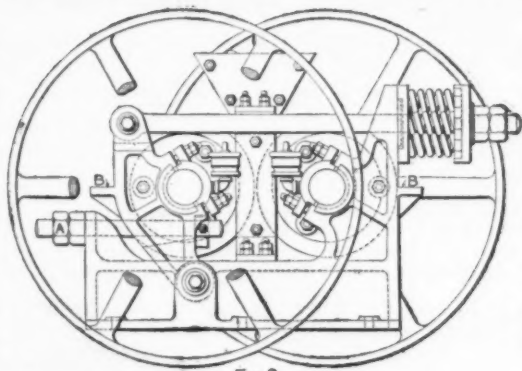


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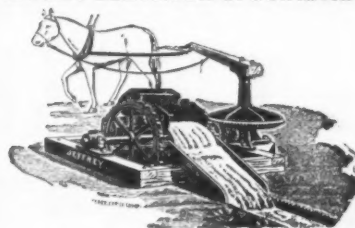
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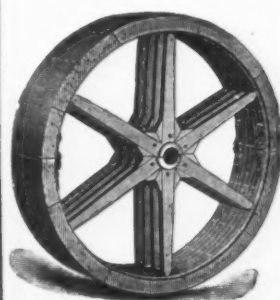
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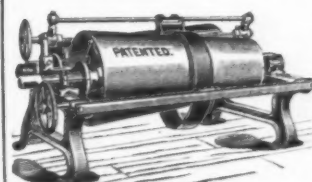
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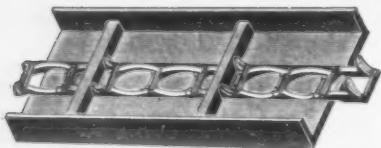
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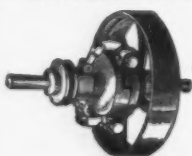
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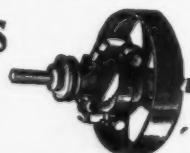
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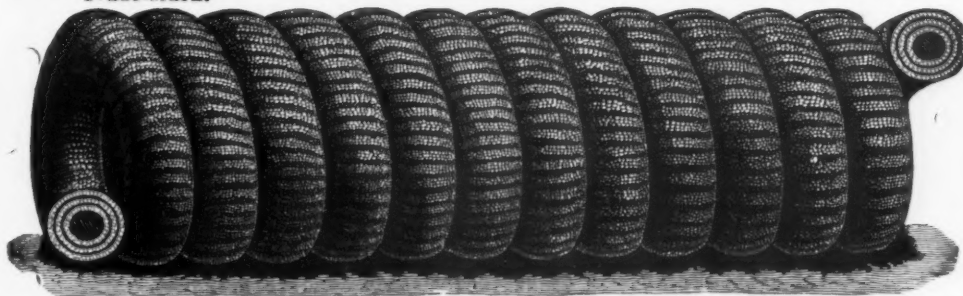
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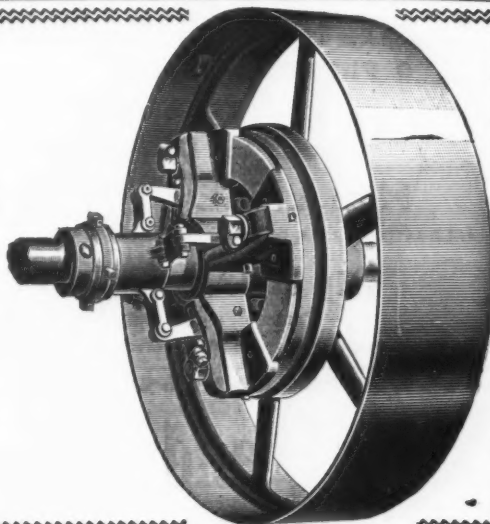
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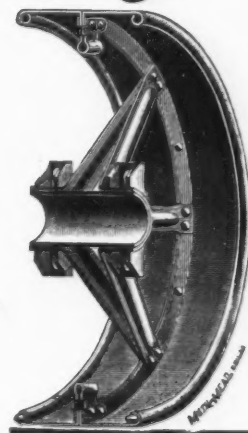
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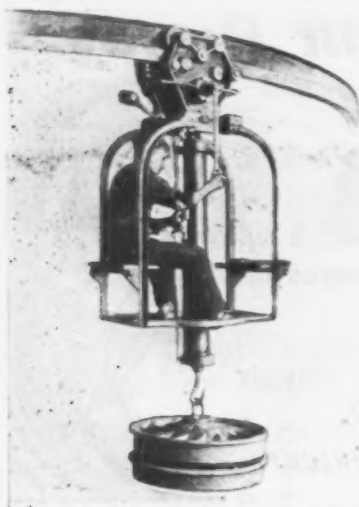
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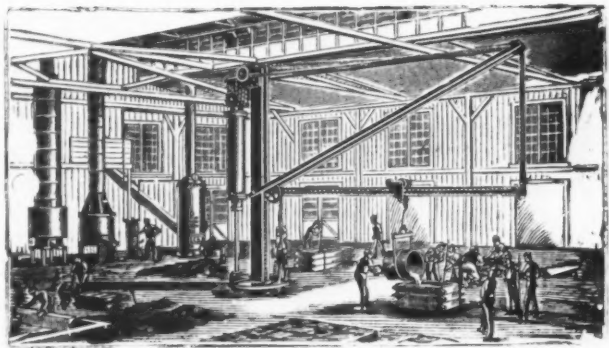
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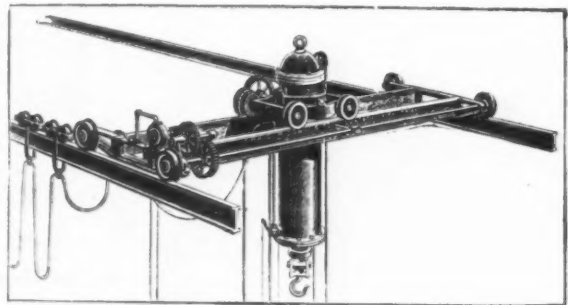
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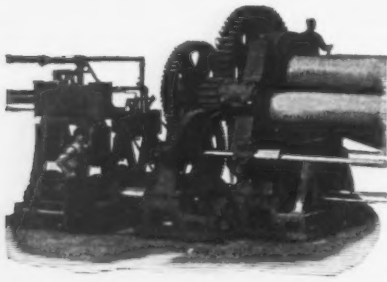
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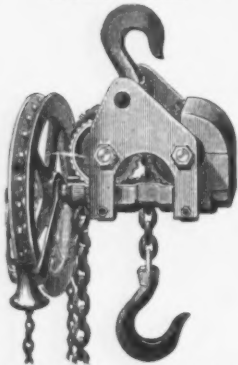
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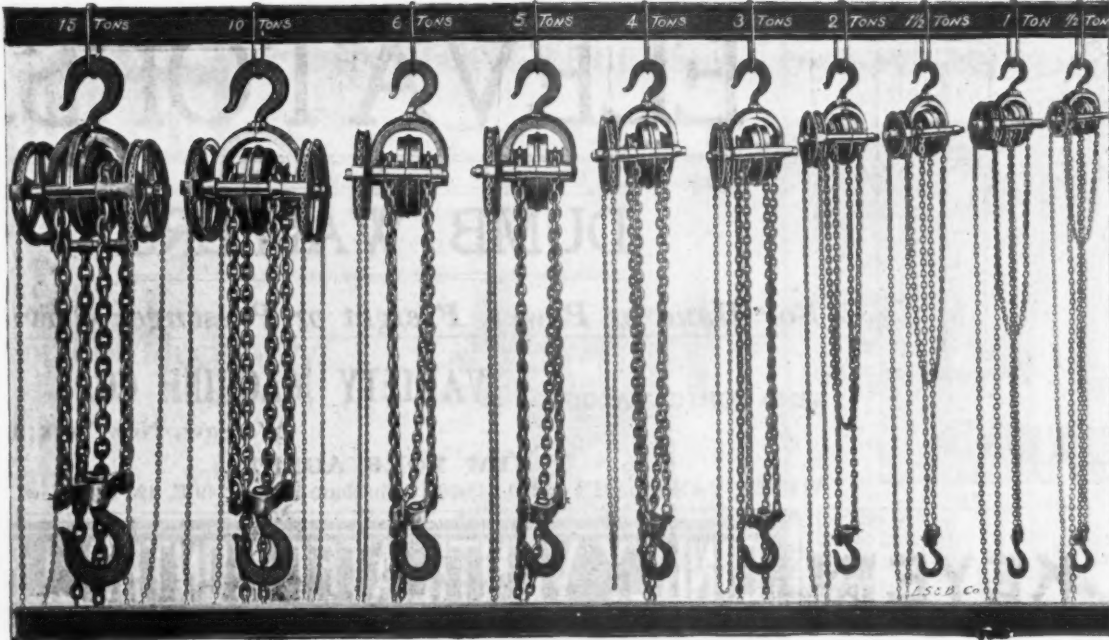
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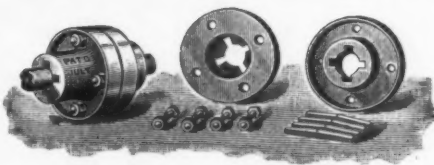
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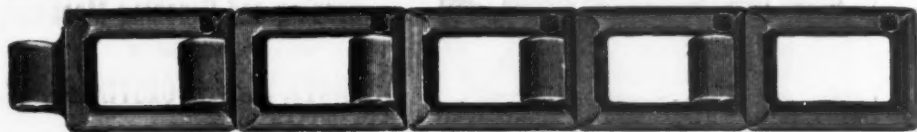


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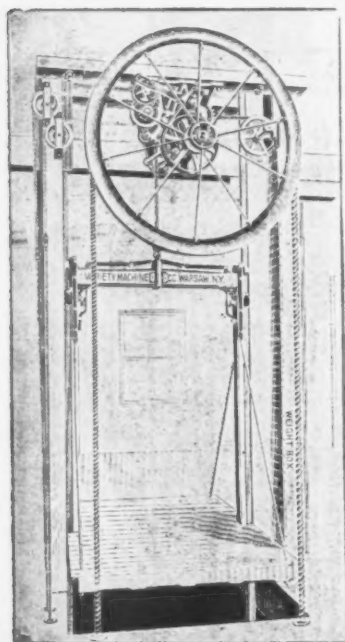
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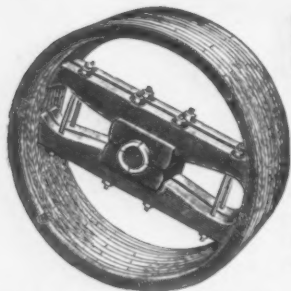
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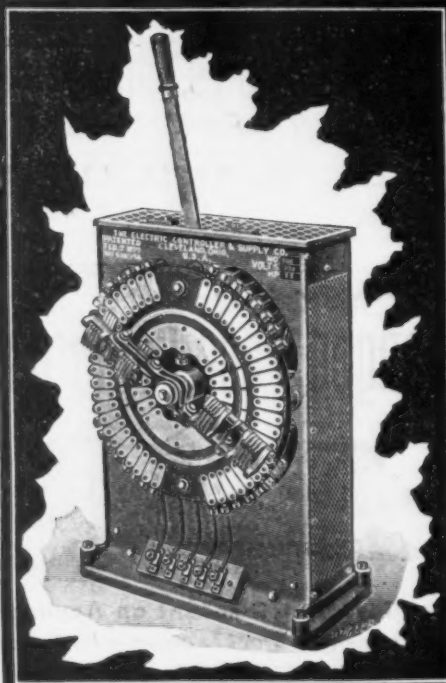
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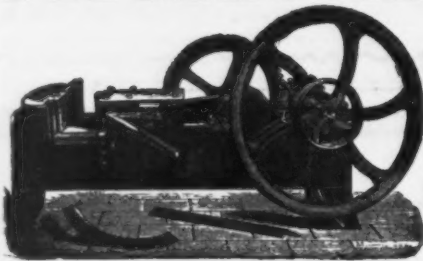
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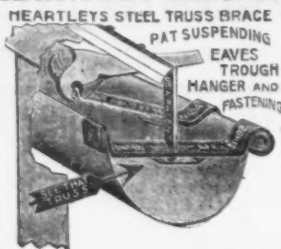
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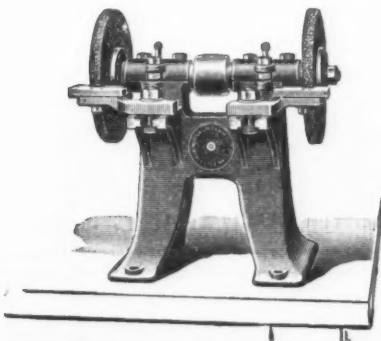


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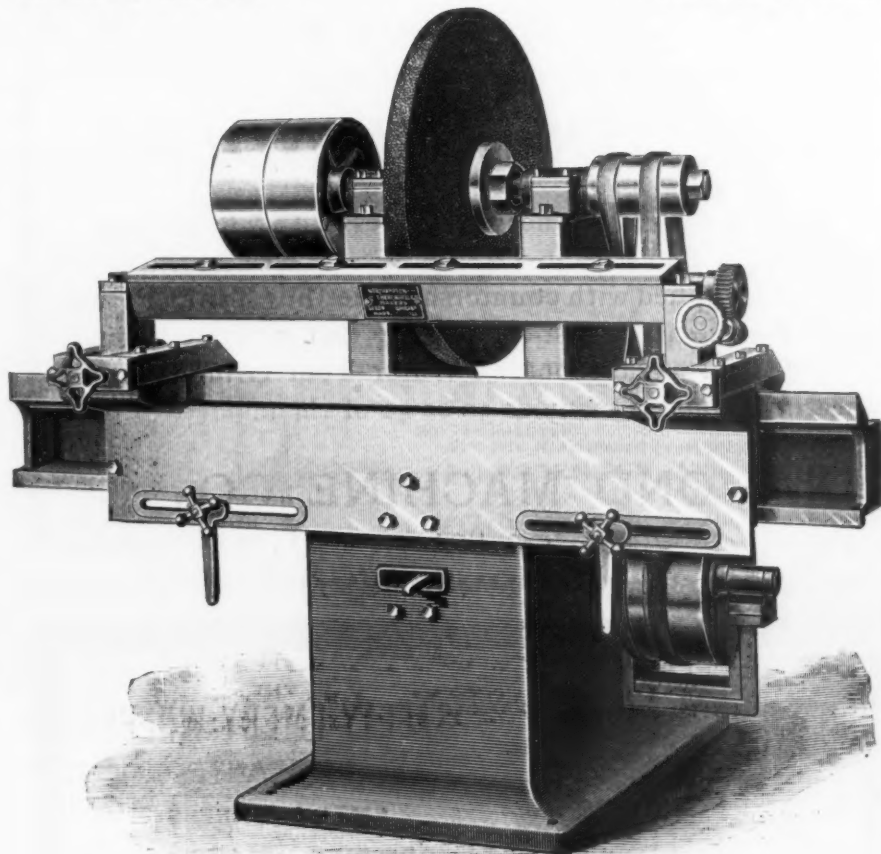
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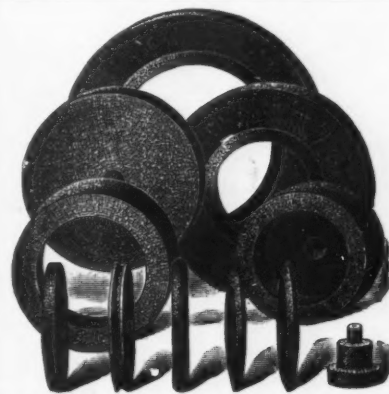
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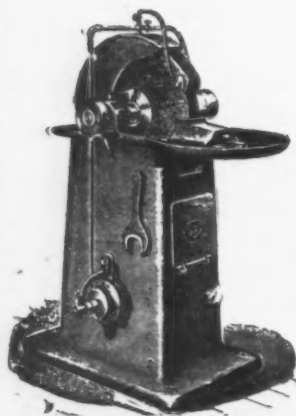
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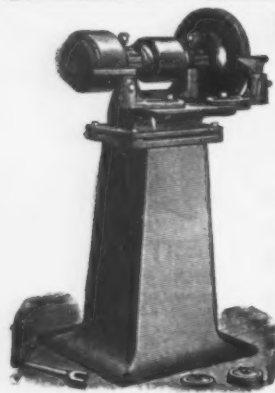
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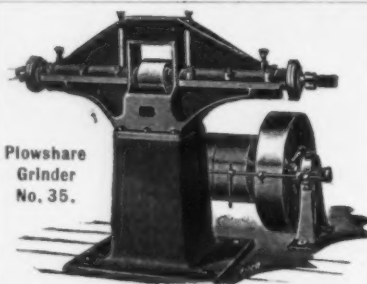
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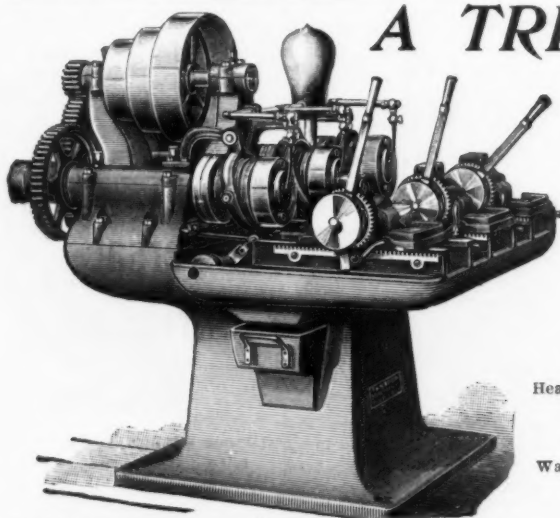
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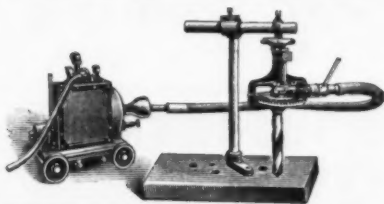
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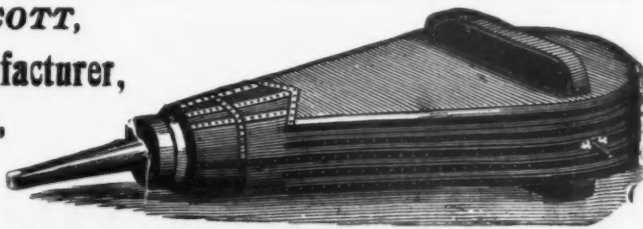


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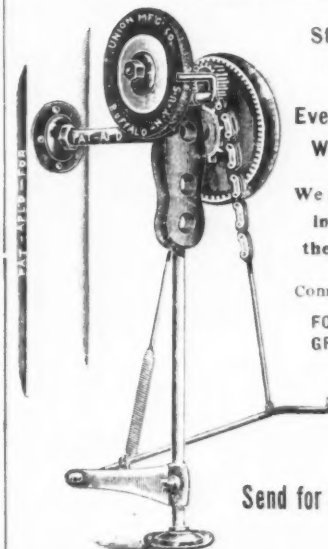
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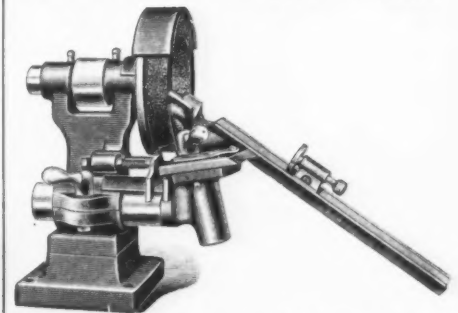
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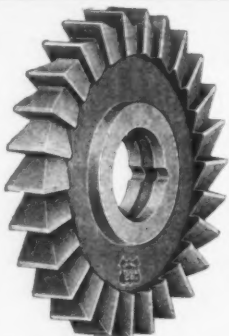
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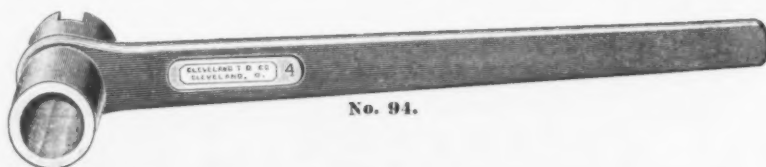


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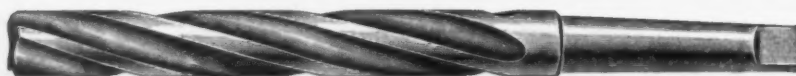
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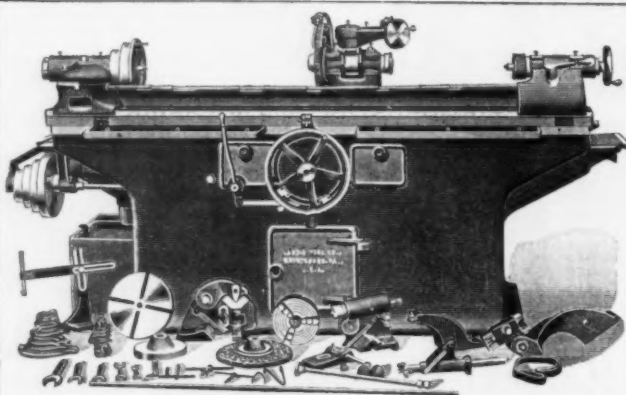
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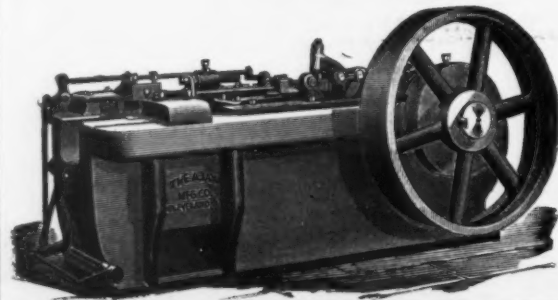
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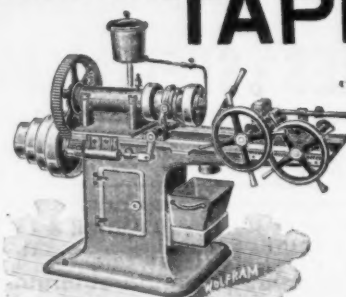
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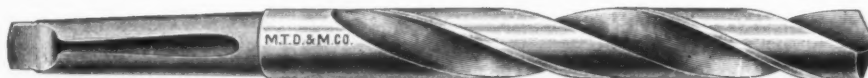
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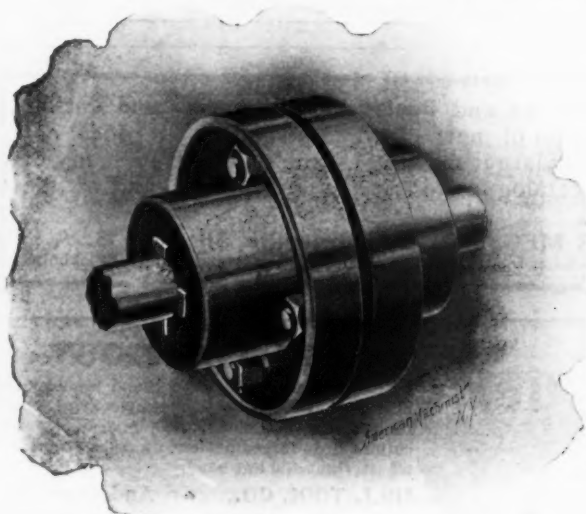
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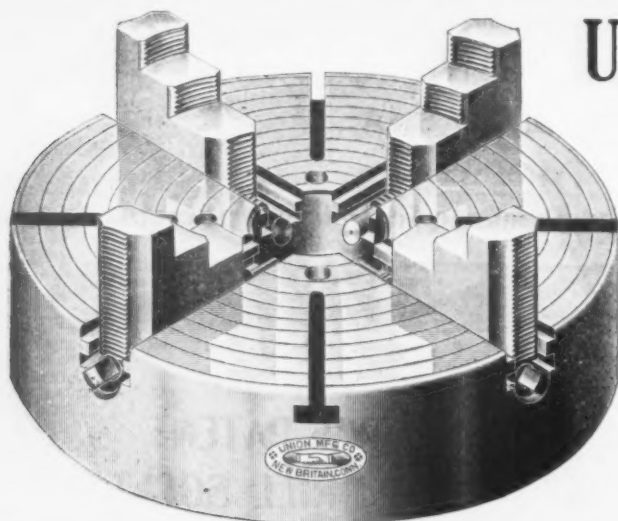
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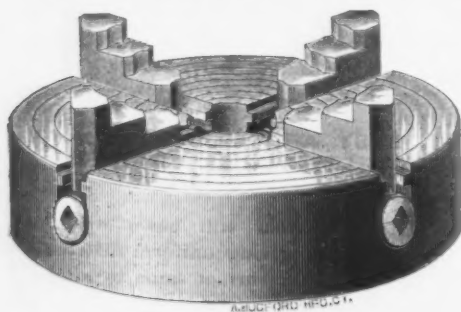
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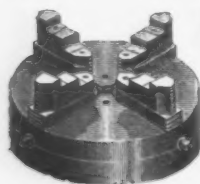
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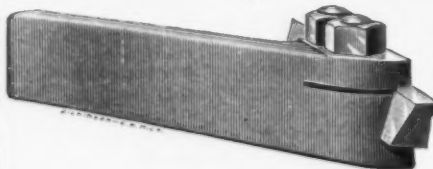


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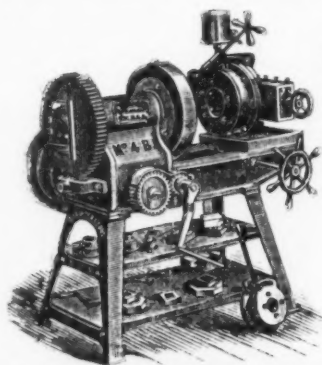
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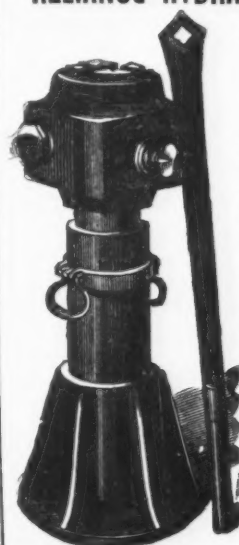
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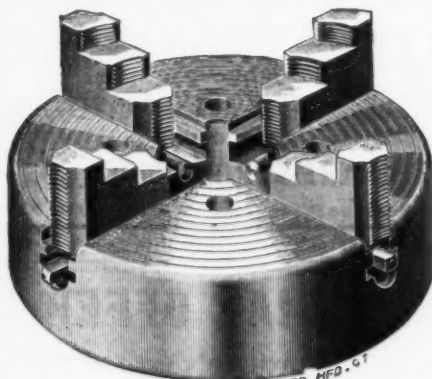
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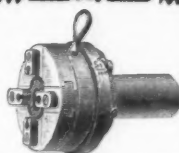
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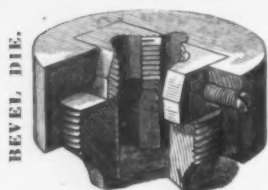
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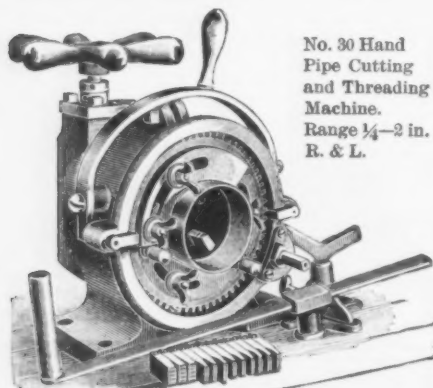
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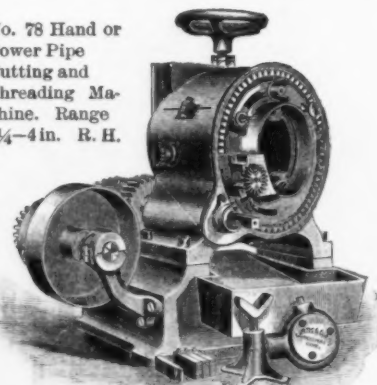
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Drills held
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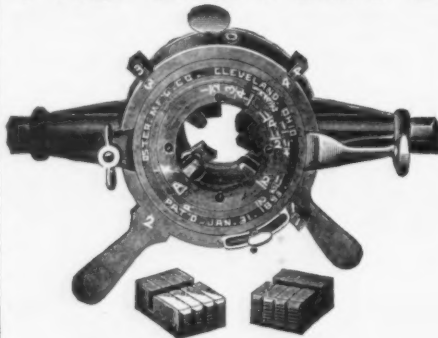
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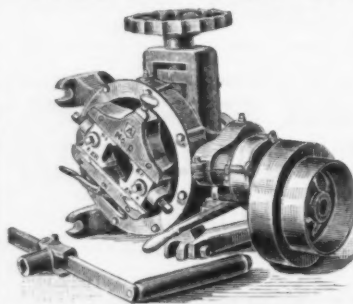
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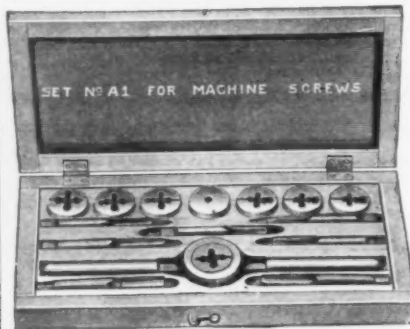
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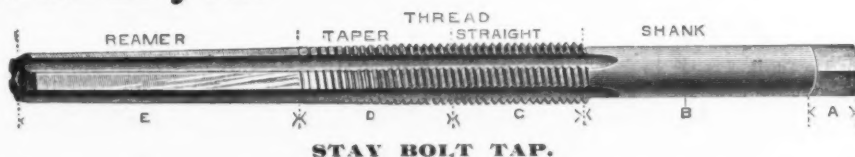


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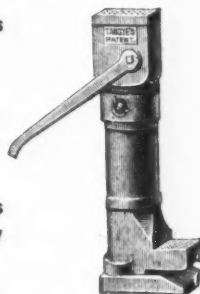
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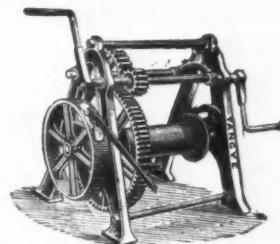
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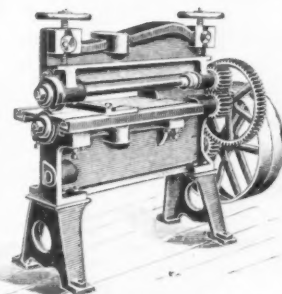
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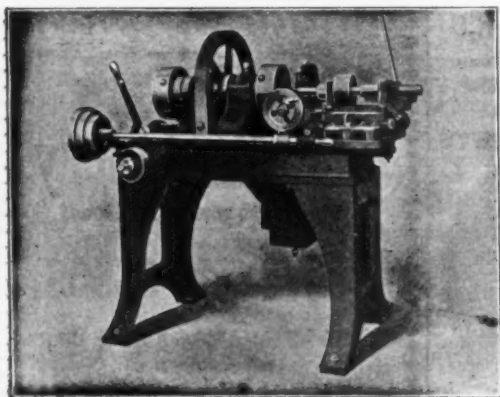
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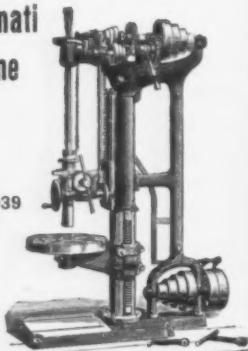
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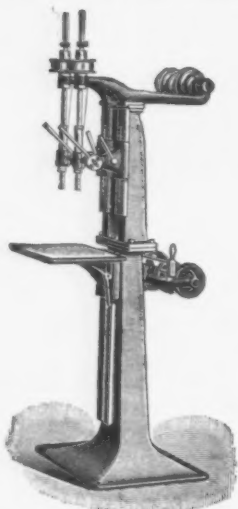
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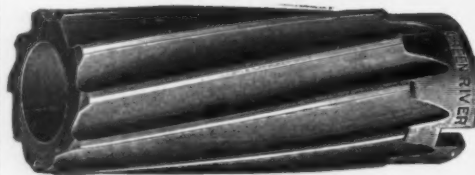
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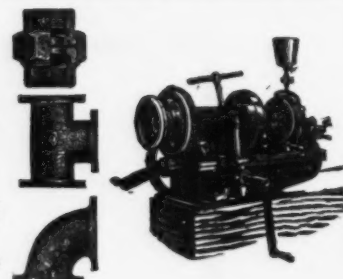
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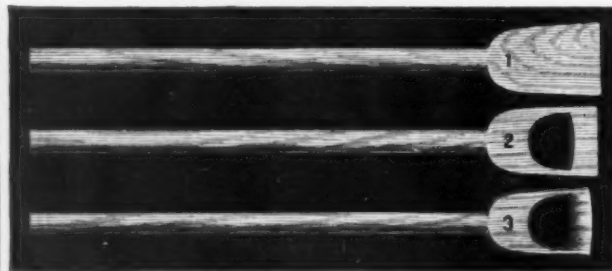
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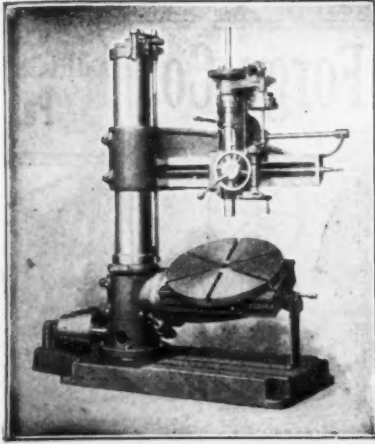
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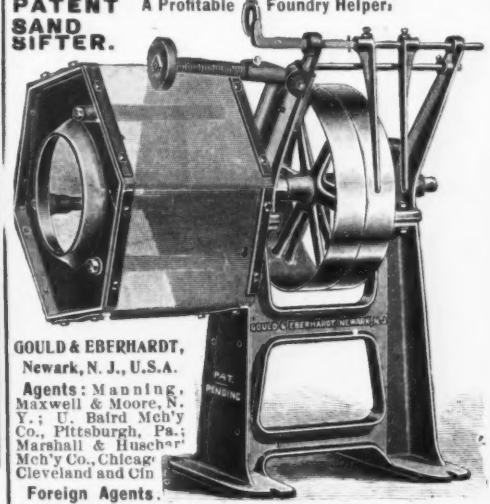
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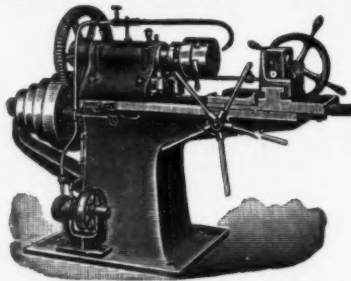


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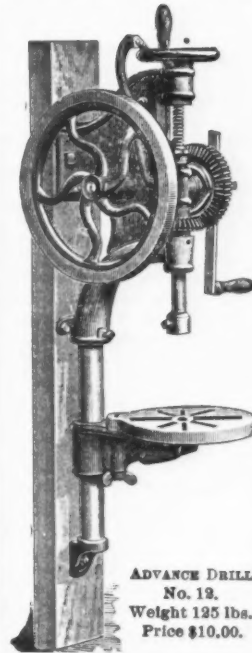
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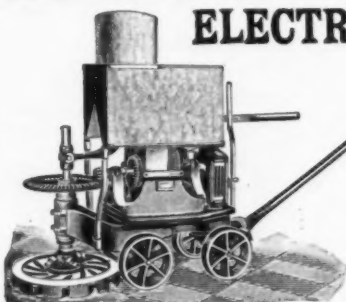
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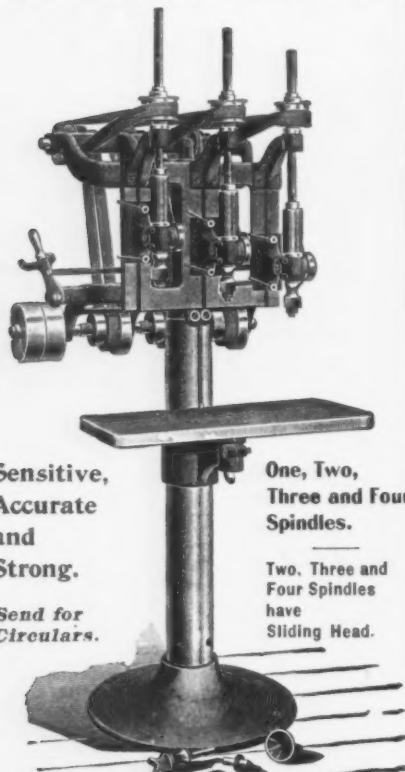
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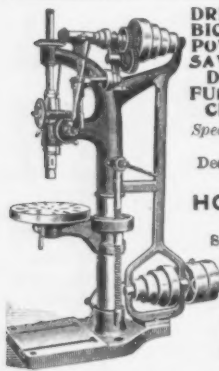
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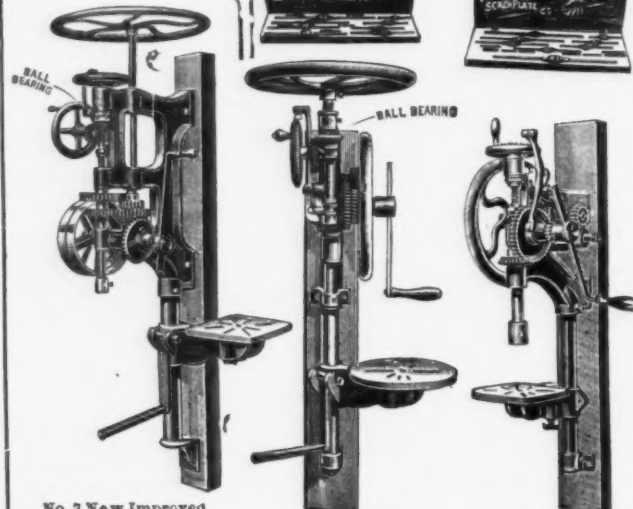
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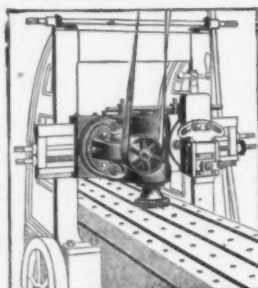
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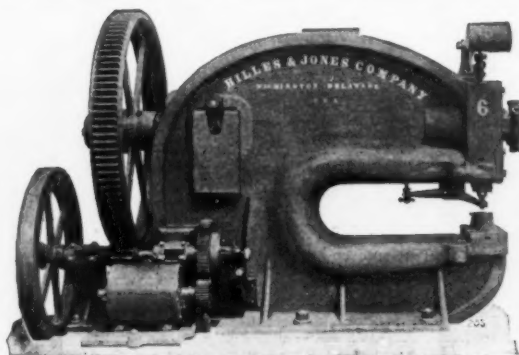
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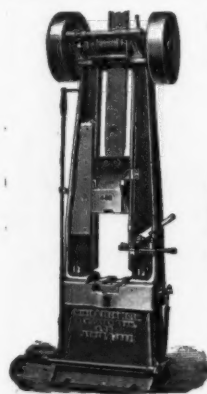
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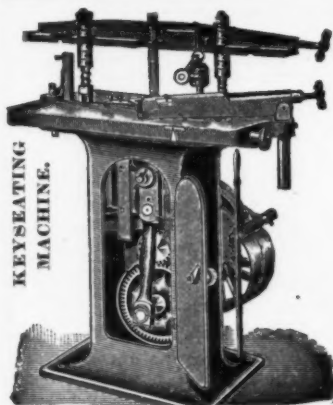
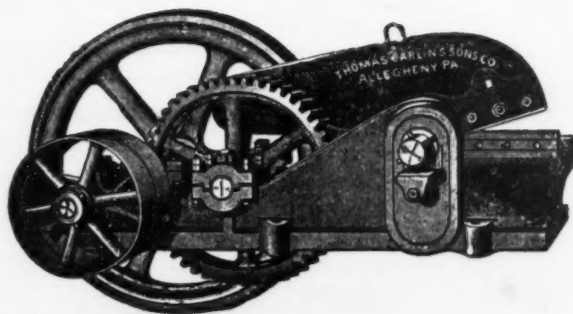
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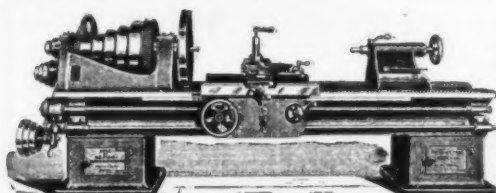
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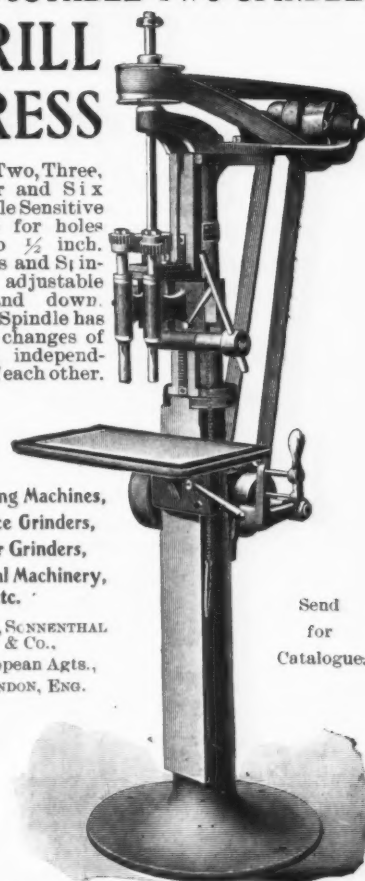
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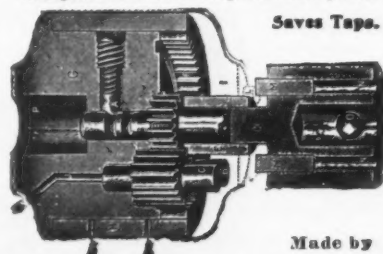
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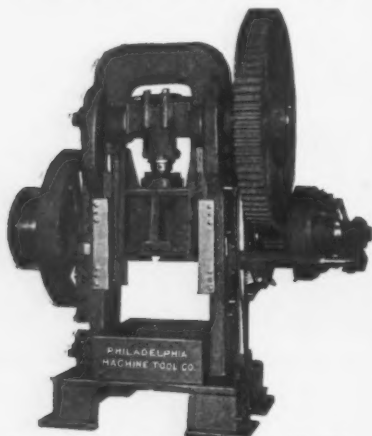


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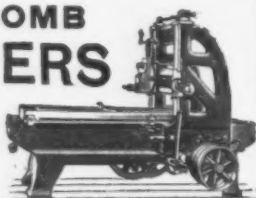
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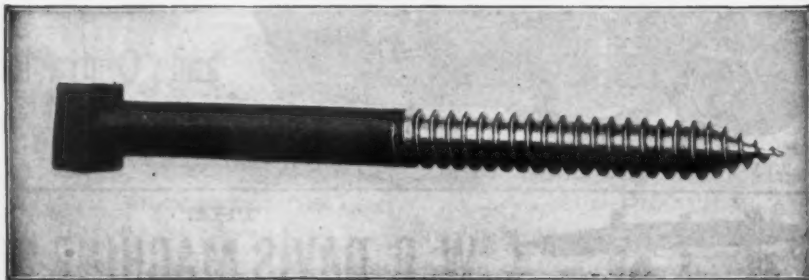
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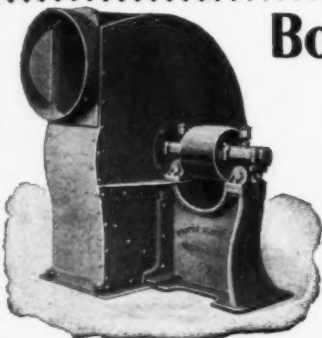


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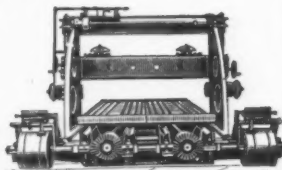
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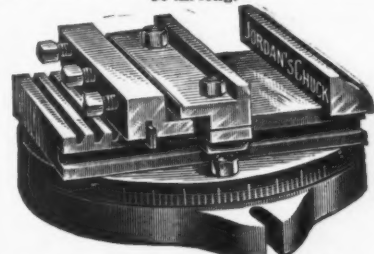
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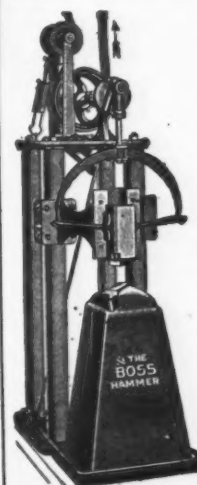
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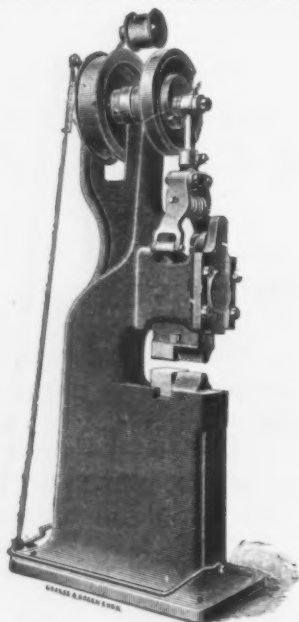
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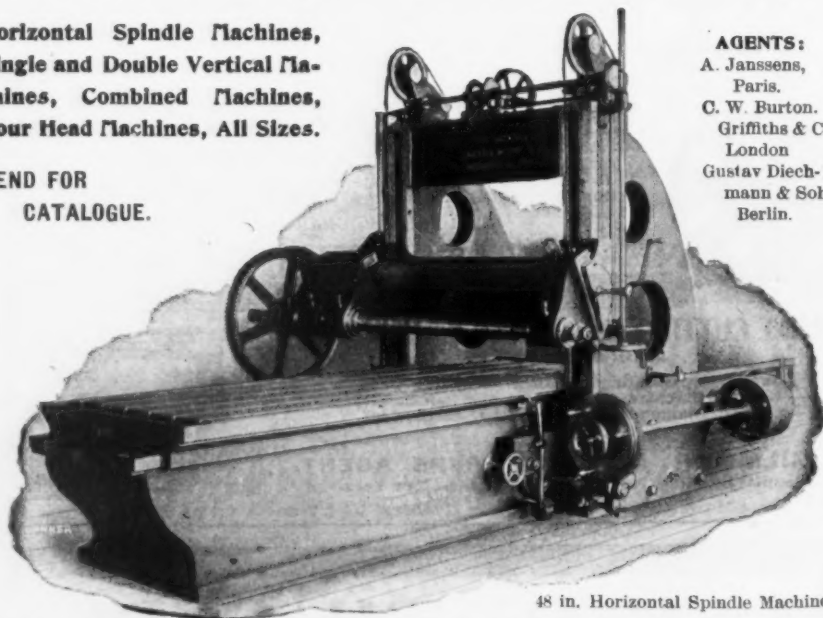


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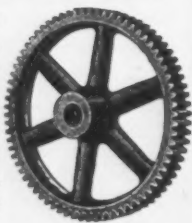
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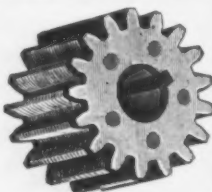


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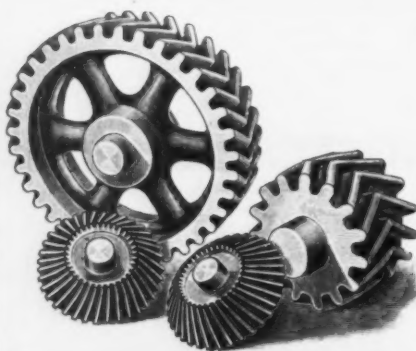
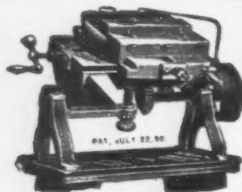
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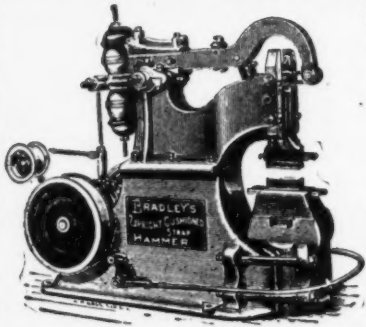
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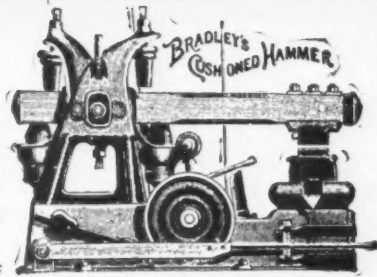
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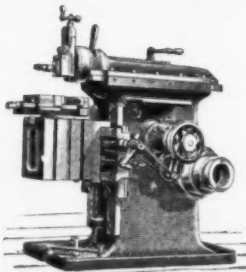
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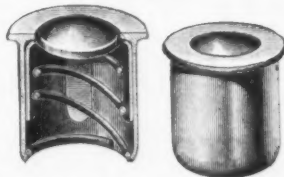
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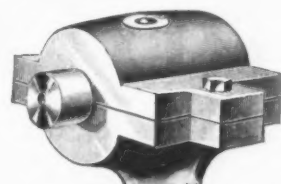
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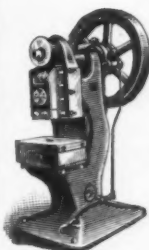
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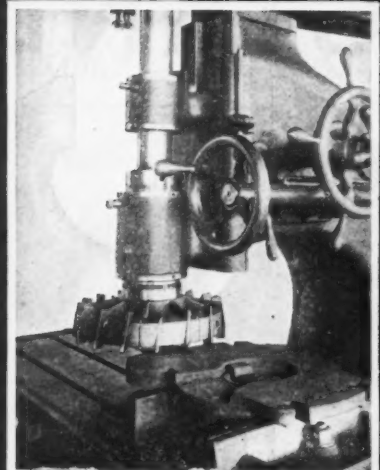
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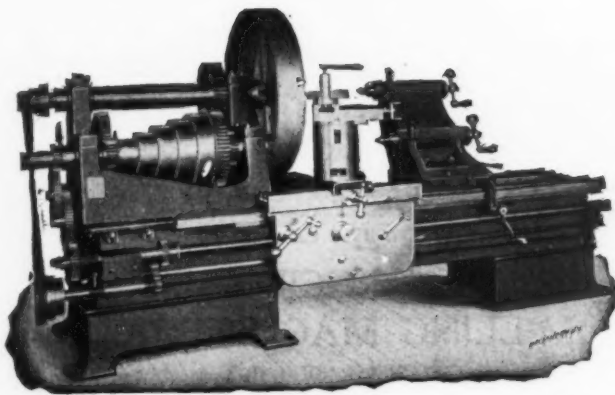
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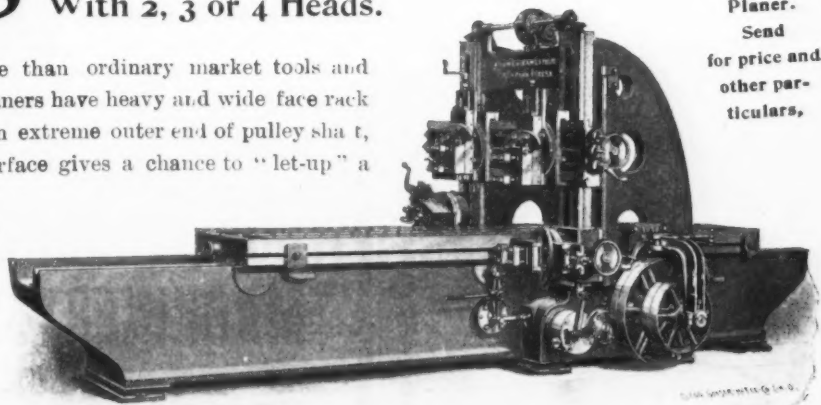
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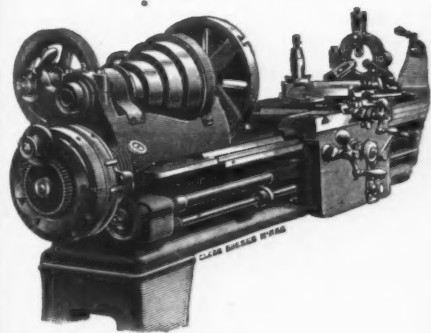
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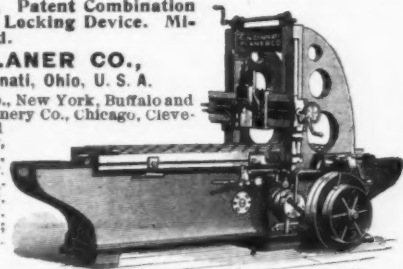
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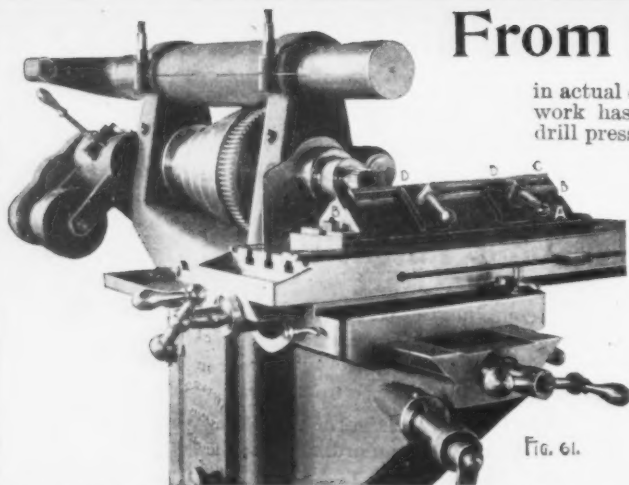
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FIG. 61.

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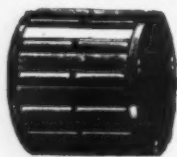
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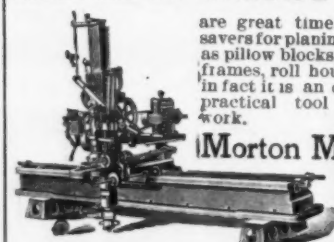
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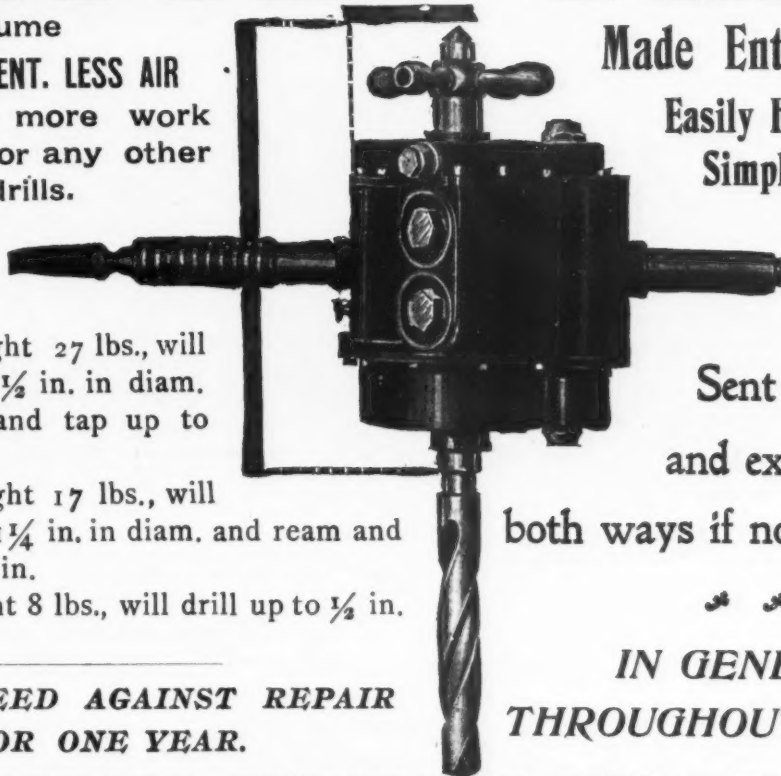
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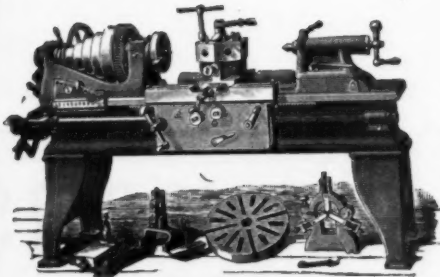
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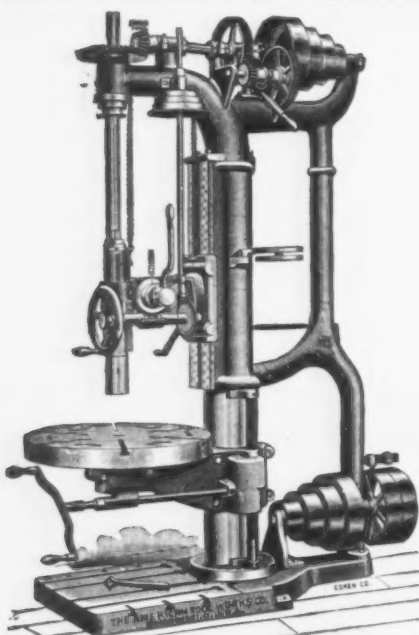
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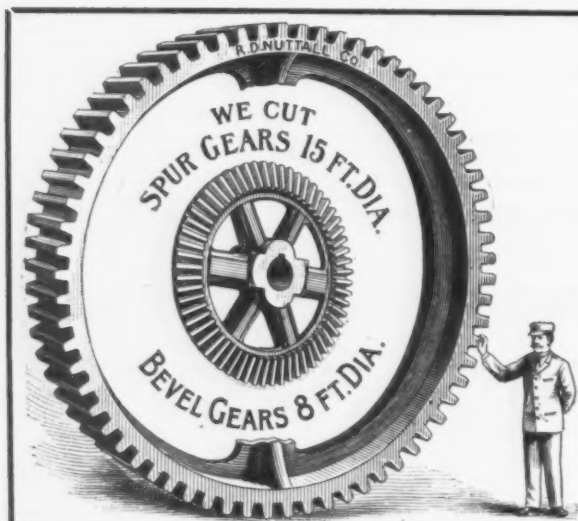


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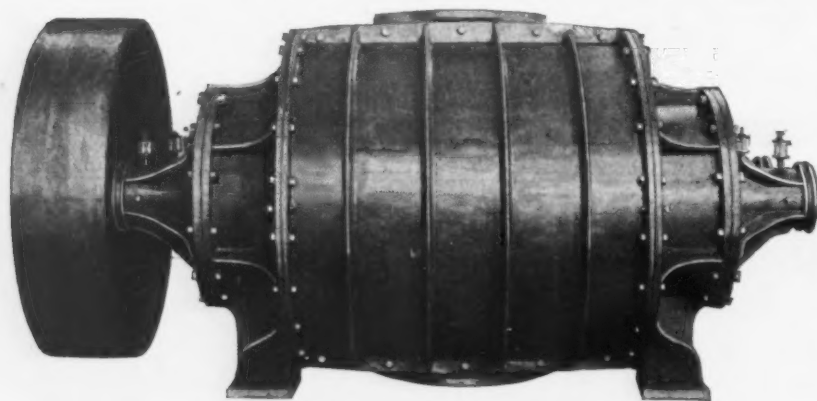


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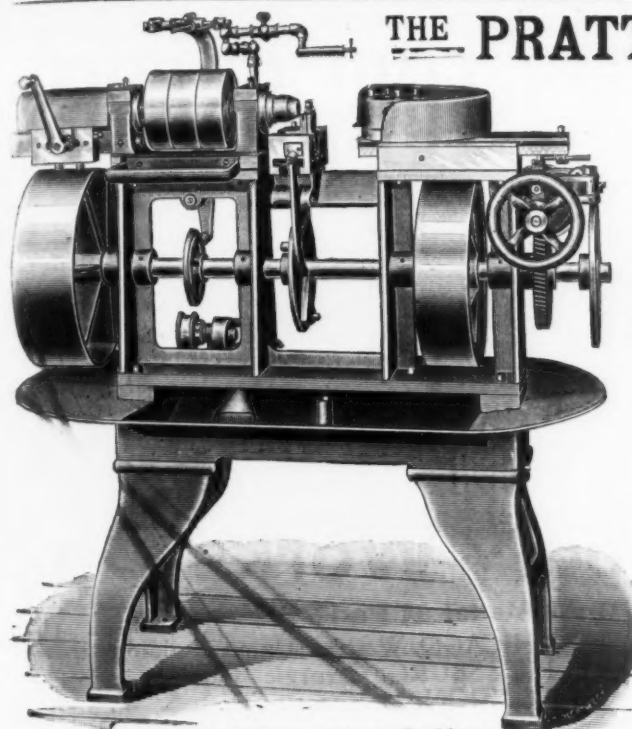
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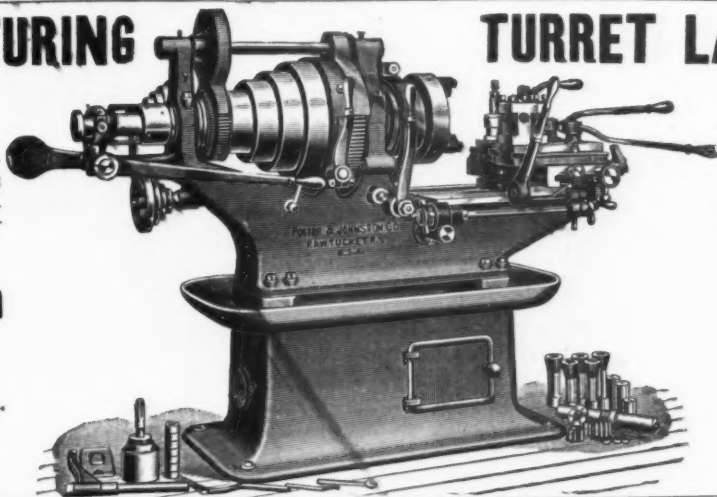
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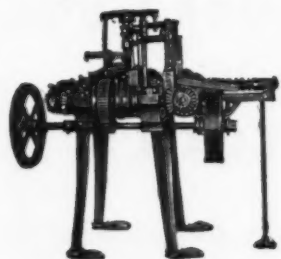
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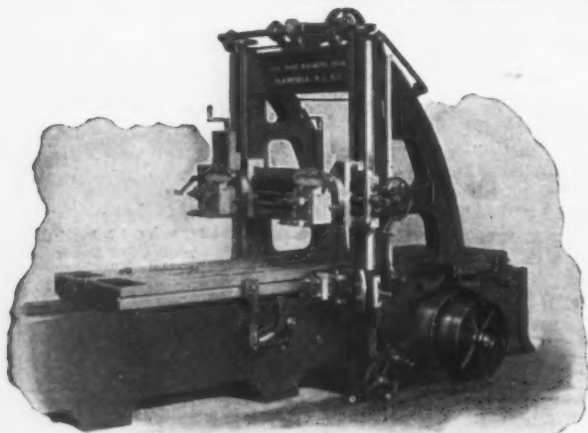
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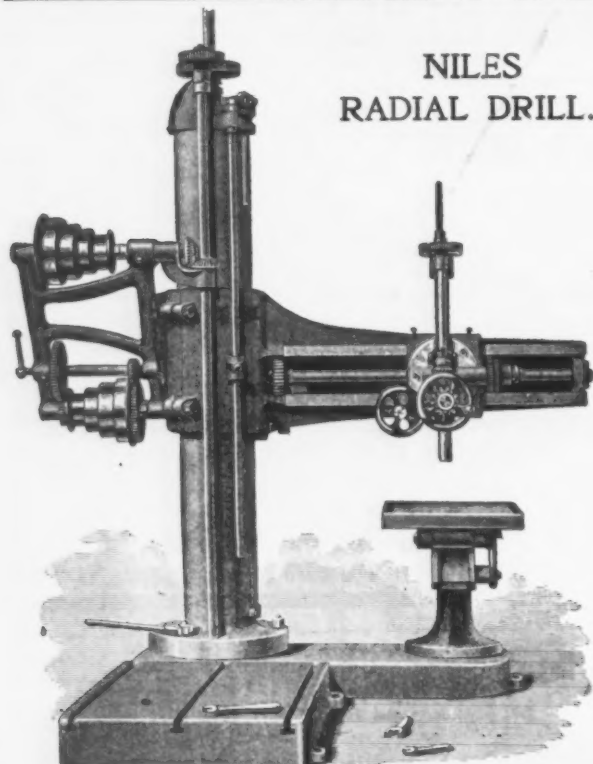
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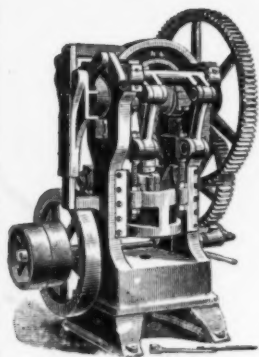
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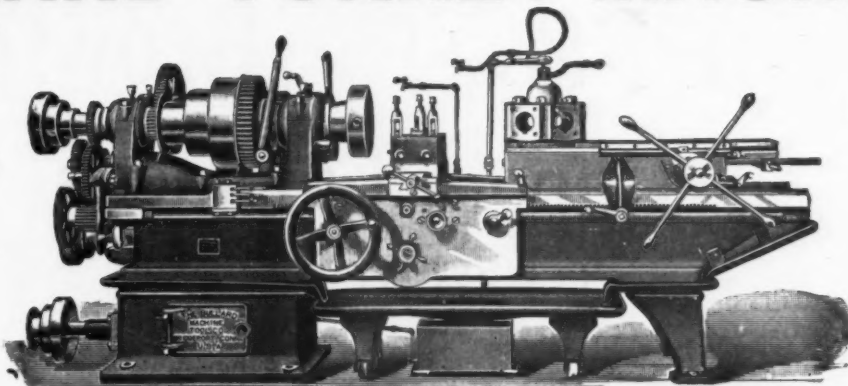
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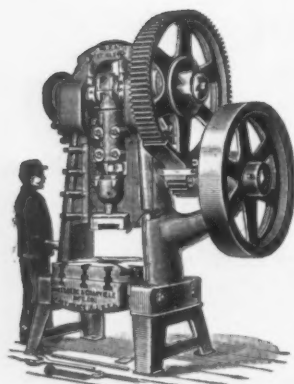
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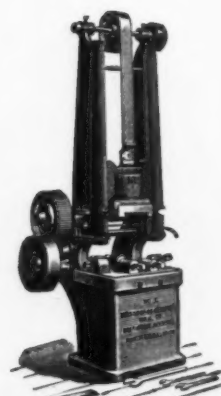
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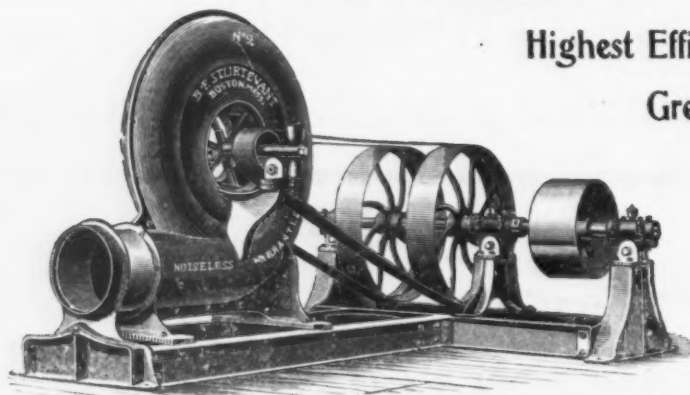
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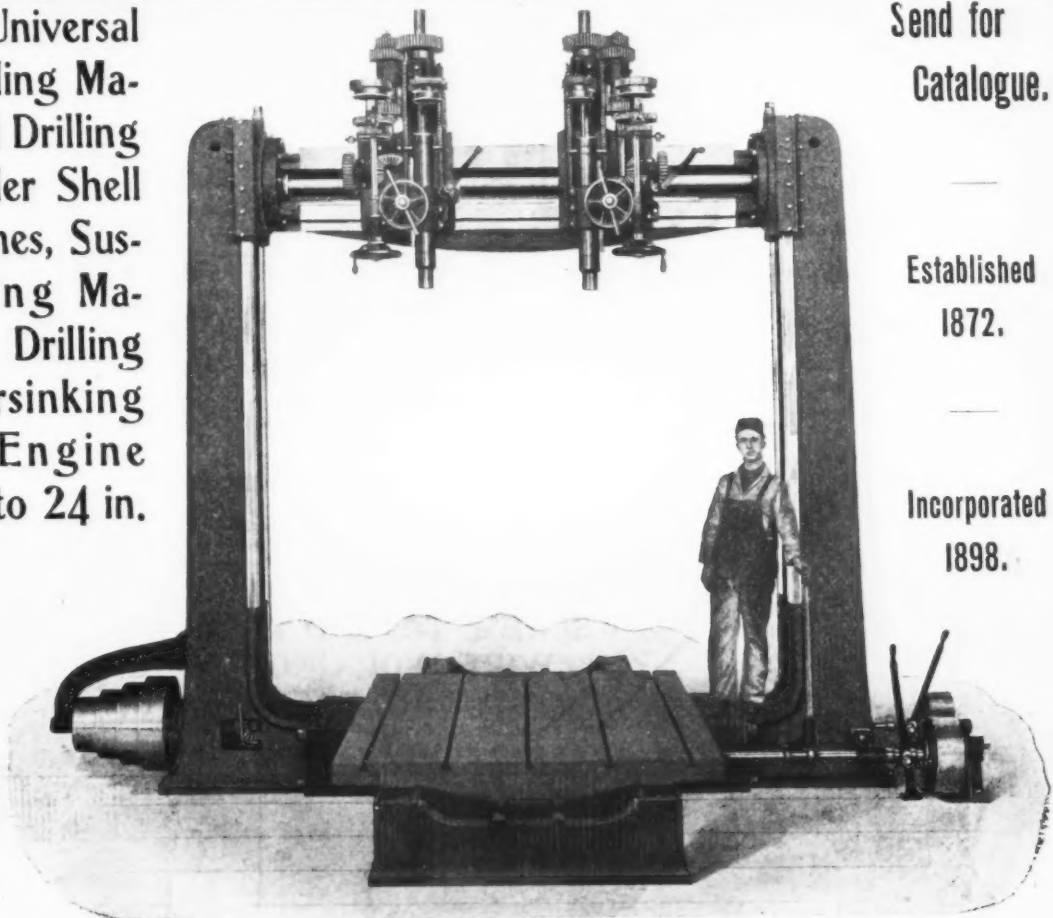
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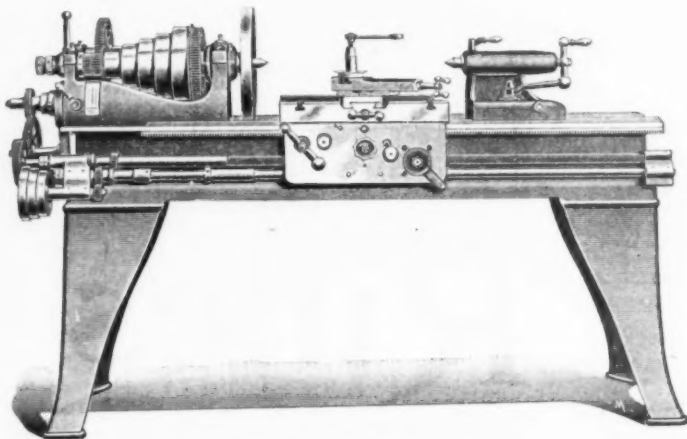
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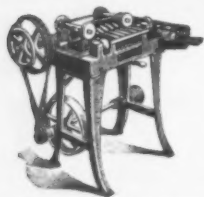
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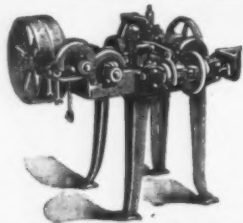
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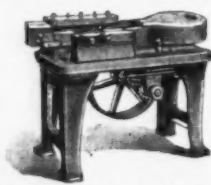
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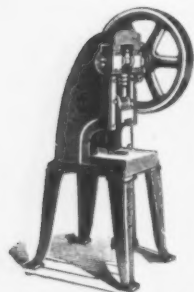
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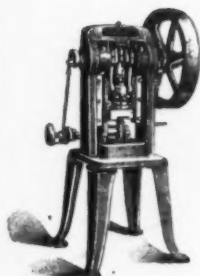


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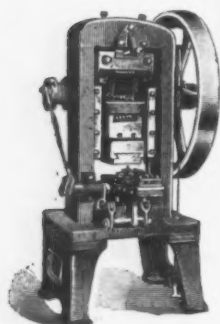
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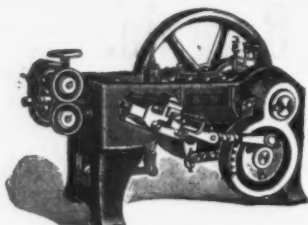
CATALOGUES.



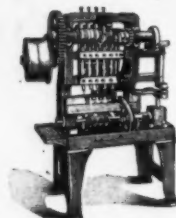
DOUBLE ACTION PRESSES.



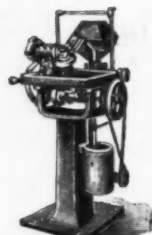
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DOUBLE STROKE HEADERS.



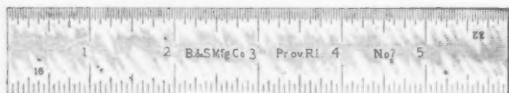
EYELET MACHINES.



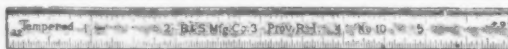
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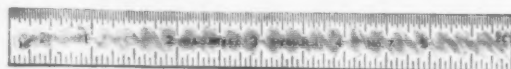
NARROW TEMPERED.



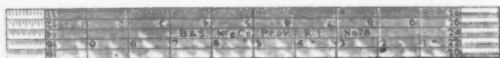
TEMPERED WITH END GRADUATIONS.



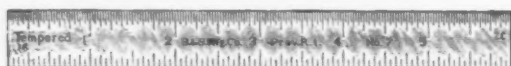
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Engines, Boilers, Pumps, Heaters, Iron and Wood Working Machinery, all makes, all kinds. Shafting, Pulley Hangers, Boxes, etc. Mining. Cupola and Forge Blowers. We make a specialty of Saw and Planing Mill Machinery.

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136 in. x 12 ft. back geared turning.
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140 lb. Bench Drop.

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Bliss No. 18 Power Press, 68 " double acting.
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Both have Peck automatic lifts.
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19 in. Trav. Hd. Sellers.
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1 40-ton 36 in. Gap Hydraulic Portable Riveter.
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EIGHTY COKE OVENS AND CONNELLSVILLE COAL IN CONNELLSVILLE REGION.

FIFTY THOUSAND ACRES OF COALING COAL ADJOINING CONNELLSVILLE REGION. NINE FOOT VEIN IN FAYETTE AND GREENE COUNTIES, PA. These lands offer the best investments now before the American public.

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Locomotive, H. K. Porter, saddle tank, stand. gauge.
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5 in. x 8 in. Hoisting Engine and Boiler.
Portable Rock Crusher, Engine, Boiler, Elevator.
Steam Shovel, Marion "C" Southern 1 1/2 yard.
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1 32 x 60 inch Wetherill R. H. Corliss Engine.
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1 42 in. x 8 ft. Ingersoll Slab Milling Machine, second hand, fine condition. Photo, etc., on application.
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50 H. P. Horizontal Tubular Boilers, guaranteed.....\$225
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36 in. "Stevens" Pulley Lathe.....75
60 in. "Huyett & Smith" Ventilating Fan.....40
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10 H. "Erie City" Upright Boiler, complete.....75
15 H. Upright Boiler, complete with fittings.....80
4 ft. x 15 in. Planer Chuck, heavy.....15
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1 100 H. P. Atlas Automatic Engine.
1 150 Buckeye Automatic Engine, size 16 x 18.
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1 100 H. P. Ball Automatic Engine, size 18 x 12.
1 50 H. P. 8 x 10 Payne Auto. Engine.
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2 40 in. x 72 in. International Power Co. Corliss Engines. Shafts 20 in. dia., 8 ft. between center of bearings. Wheels 24 in. dia., 50 ton. 1 Right hand, 1 Left hand.

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2 11 in. and 19 in. x 24 in. Tandem Compd., Buckeyes.

1 16 in. x 42 in. Allis Corliss.

1 10 in. x 12 in. Watertown Automatic.

1 12 in. x 13 in. N. Y. Safety

1 13 in. x 14 in. McIntosh-Seymour Automatic.

2 13 in. x 14 in. Watertown

1 14 in. x 13 in. Armington & Sims

1 15 1/2 in. x 16 in. N. Y. Safety

4 16 in. x 16 in. Ball

2 16 in. x 16 in. Cooper

1 18 1/2 in. x 18 in. McIntosh-Seymour

BOILERS.

2 375 H. P. Sterling Water Tubes for 150 lbs.

2 175 H. P. " " " "

2 200 H. P. National " " " 125 "

3 72 in. x 16 ft. Return Tubulars " 130 "

2 72 in. x 30 ft. " " "

1 66 in. x 18 ft. " " "

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1 1000 H. P. Nordberg Condenser.

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Every piece of machinery purchased from us leaves our shops in absolutely perfect condition; every tiny detail having received our careful attention.

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No. A 122 9 x 14 Woodbury.
No. A 123 7 x 7 slide valve.
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No. A 197 2½ x 5½ side crank.
No. A 199 8 x 16 Russell Gibbs.
No. A 200 9 x 14 side crank.
No. A 204 8 x 14 center crank.
No. A 206 18 x 28 Nicol, Burr & Co.
No. A 207 6 x 10 side crank.
No. A 213 21 x 32 Watertown.
No. A 214 7 x 10 side crank.
No. A 215 12 x 20 side crank.
No. A 217 10 x 14 center crank.
No. A 270 20 x 24 Erie City.
No. A 273 12 x 12 Ideal.
No. A 274 12 x 12 Phoenix Iron Works.
No. A 275 10 x 14 Wright & Adams.
No. A 278 9 x 16 link motion.
No. A 282 5 x 7 side crank.
No. A 296 6 x 8 Ottumwa Iron Works.
No. A 306 6 x 12 side crank.
No. A 309 10 x 18 side crank.
No. A 316 13 H.-P. Dayton gasoline.
No. A 318 4 x 8 gasoline.
No. A 326 12 x 18 side crank.
No. A 326 8 x 12 Webster, Camp & Lane double cylinder hoisting.
No. A 355 12 x 16 side crank.
No. A 357 10 x 14 Suttlee Engine Company.
No. A 359 16 x 36 patent gear valve motion.
No. A 371 5 x 9 side crank.
No. A 376 1 15 H.-P. Westinghouse Junior.
No. A 377 14 x 14 Ideal.
No. A 380 11 x 18 Sinker, Davis & Co.
No. A 381 12 x 22 Tangye bed automatic.
No. A 382 4½ x 10 side crank.
No. A 419 8 x 10 Atlas.
No. A 438 11 x 18 x 16 McEwen tandem compound.
No. A 439 10 x 12 Ball automatic.
No. A 440 9 x 16 Rice automatic.
No. A 441 16 x 36 Corliss.
No. A 443 1 double cylinder 50 H.-P. Raymond gasoline.
No. A 445 10 x 22 side crank.
No. A 449 3½ x 4 center crank.
No. A 457 6 x 8 double cylinder hoisting.
No. A 446 5 x 12 upright.
No. A 467 2 x 3 upright.
No. A 600 13 x 18 single valve Russell.
No. A 601 14 x 20 4-valve Russell.
No. A 602 1 22½ x 36 Wright automatic Corliss.
No. A 603 14 x 20 Struthers, Wells & Co.
No. A 604 10½ x 12 Taylor Beck automatic.
No. A 608 13 x 22 x 13 two Westinghouse compound.
No. A 609 17½ x 24 two Williams automatic.
No. A 468 5 x 12 upright, 12 x 24 inch floor space.
No. A 352 9 x 14 center crank.
No. A 349 6 x 8 double engine hoisting.
No. A 342 15 x 32 side crank.
No. A 202 8 x 10 elevator double hoisting, with drum.
No. A 198 1½ x 2 marine type.
No. A 201 8 H.-P. gasoline.
No. A 127 8 x 12 automatic side crank.
No. A 455 Payne automatic compound.
No. A 476 10 x 24 Greenwall side crank.
No. A 501 12 x 16 F. C. Wells side crank.
No. A 482 20 x 30 Poppet valve motion.
No. A 487 Ten 9 x 12 Tiff center crank.
No. A 479 10 x 20 side crank.
No. A 480 5 x 12 side crank.
No. A 486 11½ x 14 center crank.
No. A 502 Two 8 x 16 side crank.
No. A 503 16 x 25 side crank.
No. A 485 10 x 22 side crank.
No. A 504 6 x 8 side crank.
No. A 505 6 x 12 side crank.
No. A 506 7 x 12 Rice aut. Tangye bed.
No. A 611 8½ x 14 x 12 McEwen tandem.
No. A 612 5 x 6 marine.
No. A 613 8 H.-P. Otto gas.
No. A 614 Two 300 H.-P. Westinghouse auto.

ELECTRICAL.

No. A 220 15 H.-P. electric motor, Keystone No. 344, with worm gear for hoisting.
No. A 221 1200-light, Slatery alternator.
No. A 222 50 K. W. dynamo.
No. A 223 Two U. S. Westinghouse 80 K. W. generators.
No. A 224 Hancock inspirator, 1½ inch.
No. A 225 500-light National dynamo.
No. A 226 400-light Thom. Houston dynamo.
No. A 227 500-light Thom. Houston dynamo.
No. A 228 150-light U. S. Weston dynamo.
No. A 229 Outfit consisting of 8½ x 14 x 12 McEwen tandem compound engine with 50 K. W. direct connected dynamo and 100 H.-P. Sterling boiler.

LATHES.

No. A 262 1 10 in. x 4 ft. metal lathe.
No. A 454 1 16 in. x 6 ft. metal lathe.
No. A 256 1 20 in. x 7 ft. metal lathe.
No. A 260 1 14 in. x 5 ft. Pond engine lathe.
No. A 261 1 16 in. x 5 ft. Ames engine lathe.
No. A 266 1 20 in. x 4 ft. Franklin plane lathe.
No. A 259 1 20 in. x 10 ft. Shepard.
No. A 341 1 16 in. x 6 ft. screw cutting engine lathe.
No. A 339 2 18 in. x 8 ft. Shepard screw cutting engine lathes.
No. A 402 2 12 in. x 4 ft. special lathes for brass turning.
No. A 338 1 tapping lathe with compound gears.
No. A 310 1 12 in. x 4 ft. Barnes foot power wood turning lathe.
No. A 363 1 wood turning lathe, 4-step cone pulleys.
No. A 267 1 special lathe for wood work, 18 in. x 5 ft.
No. A 264 1 6 in. x 4 ft. speed lathe.
No. A 401 2 12 in. x 4 ft. 6 in. speed lathes.
No. A 387 2 12 in. x 5 ft. speed lathes.
No. A 403 2 14 in. x 5 ft. speed lathes.
No. A 406 2 14 in. x 4 ft. extra heavy speed lathes.
No. A 392 1 12 in. swing turret speed lathe.
No. A 404 1 13 in. swing turret speed lathe.
No. A 400 1 14 in. swing turret speed lathe.
No. A 396 5 4 ft. 6 in. bed turret speed lathes.
No. A 398 2 7 in. x 5 ft. turret lathes.
No. A 148 4 60 in. diam. x 4 ft. 6 in. high.
No. A 144 2 48 in. diam. x 7 ft. high.
No. A 142 1 30 in. diam. x 4 ft. high.
No. A 141 1 36 in. diam. x 5 ft. 4 in. high.
No. A 140 2 66 in. diam. x 5 ft. 2 in. high.
No. A 138 6 48 in. diam. x 8 ft. high.
No. A 14 1 42 in. diam. x 14 ft. high.
No. A 12 1 48 in. diam. x 6 ft. high.
No. A 11 1 72 in. diam. x 6 ft. high.

STEEL TANKS.

No. A 390 Double buffer or polishing stand, 48 in. mandrel.
No. A 389 Double buffer, 24 in. mandrels.
No. A 393 Double spindle brass shaper, pulley 6 in. diam., 3 in. face.
No. A 395 Polisher or buffer.
No. A 459 Brazing outfit, tank and four burners.
No. A 173 Rod or bolt tapping machine, thread up to 1½ in.
No. A 128 6 bolters or rattlers, solid cast iron, 4 ft. long, 24 in. diam.
No. A 434 1 hydraulic press, 2 x 3 ft., capacity 9 tons.
No. A 363 1 power drill press, 20 in. swing.
No. A 370 1 Yankee drill press, 20 in. swing.
No. A 369 1 hand power post drill press, 20 in. swing.
No. A 340 1 rod bolt threader up to 1½ in.
No. A 343 1 Hotchkiss trip hammer, graded to strike 2000 pounds.
No. A 346 1 cold steel saw, 48 in. diam., with 4 saws.
No. A 348 1 set of hot rows for angle irons.
No. A 368 1 double emery stand, 36 in. long.
No. A 388 1 surface emery grinder, takes in 12 in. wheel.
No. A 428 1 double arbor buffing or emery grinder.
No. A 227 3 hand power pipe threading machines, from ½ to 2 in.
No. A 226 1 pulley key seater, up to 3 in.
No. A 344 1 pulley key seater, any diam., 3 in. face.
No. A 421 1 belt tightener, 2 ft. 6 in. long.
No. A 458 1 tinner's power rollers for straightening, 9 ft. long.
No. A 410 1 power grinding stone, 28 in. stone.
No. A 468 1 power grinding stone, 16 in. stone.
No. A 372 1 boiler maker's power roll, 42 in. long.
No. A 334 1 extra heavy tire shrinker, 4 in. wide.
No. A 409 1 tire bender for 2½ in. tire.

FANS AND BLOWERS.

No. A 159 1 48 in. power ventilating fan.
No. A 277 1 No. 9 Smith hot blast apparatus.
No. A 10 10 blowers, Chattanooga No. C14.
No. A 9 1 Gleason & Bailey blower, No. 9.
No. A 25 10 hand power blowers, Hoffman, 14 in. diam.
No. A 45 1 54 in. Garden City window ventilating fan.
No. A 2 1 No. 3 Sturtevant blower.
No. A 354 1 No. 5 Sturtevant blower, noiseless.
No. A 1 1 No. 7 Sturtevant blower, noiseless.
No. A 423 2 No. 7 Buffalo noiseless blowers.
No. A 6 1 No. 8 Buffalo blower.

No. A 124 1 No. 5 Buffalo cupola and forge blower.
No. A 5 1 No. 10 Buffalo blower.
No. A 8 1 10 in. Buffalo blower.
No. A 300 7 Andrews & Johnson steam driven exhaust fans.
No. A 7 1 No. 1 Champion blower.

AIR COMPRESSORS.

No. A 358 1 9 x 9 Clayton duplex.
No. A 195 1 44 x 6 Clayton.
No. A 118 2 12 x 16 air compressors.

HEATERS.

No. A 301 2 Smith Hill open heaters, 35 to 50 H.-P.
No. A 448 1 Bearman feed water heater, 24 in. diam., 8 ft. long.
No. A 447 1 Barragwanath feed water heater, 18 in. diam., 6 ft. 6 in. high.
No. A 211 1 Payne hot water or steam heater, 600 ft. radiation.
No. A 205 1 No. 3 Rice & Whitacre heater.
No. A 126 1 Stillwell-Bierce No. 4 heater.

HOISTING RIGS.

No. A 131 1 H.-P., 24 in. drum.
No. A 132 1 H.-P., 20 in. drum.
No. A 411 2 2 ton Reedy elevator hoists, 32 in. drum.
No. A 347 1 9 ton swinging crane, mast 14 ft. high.
No. A 432 2 "A" shaped house derricks, 40 ft. high.
No. A 438 1 "A" shaped house derrick, 30 ft. high.

WATER WHEELS.

No. A 157 2 36 in. turbine water wheels.
No. A 353 2 36 in. Backus water motors.
No. A 463 1 Tuerks 16 in. water motor.
No. A 464 3 Tuerks 8 in. water motors.

SHEARS.

No. A 330 1 double shear, with engine, cyl. 8 x 9, jaws 15 in.
No. A 331 1 double shear, with engine, cyl. 8 x 8, jaws 14 in.
No. A 327 1 hand power shear and punch. Will shear from ½ to 10 in. wide.
No. A 328 1 hand power shear. Will shear up to 8 gauge iron.
No. A 345 1 hand power or belt power punch and shear up to 3-16 iron.

COMBINED OUTFITS.

No. A 442 1 combined engine and boiler, each on separate base, 24 x 48 in. upright boiler, 4½ x 5 upright engine.
No. A 329 1 hoisting rig, 2 separate engines, 2 hoisting drums attached to 36 in. x 6 ft. boiler, 5 x 12 upright engines.
No. A 323 6 x 7 Baxter engine and boiler.
No. A 294 8 x 9 Davey safety engine and boiler.
No. A 216 1 single drum 7 x 10 engine and 72 x 36 in. boiler.
No. A 212 1 portable 10 ft. x 28 in. fire box boiler and 5 x 12 engine.
No. A 209 1 8 ft. x 3 ft. 6 in. portable fire box boiler and 7 x 12 engine, with hoist drum and winches.
No. A 208 1 12 x 3 ft. portable fire box boiler and 6 x 12 engine.

MISCELLANEOUS.

No. A 172 1 double roller paint or ink grinder for power.
No. A 125 1 No. 1 Hubbard portable bake oven.
No. A 317 144 in. ½ in. brass pipe.
No. A 417 24 in. cider or wine press.
No. A 429 1 passenger elevator car, 4 ft. 6 in. x 4 ft. 8 in. wide.
No. A 430 1 steel rotary car, 2 ft. 6 in. x 2 x 5 ft.
No. A 431 10 turnstiles from Omaha Exposition.
No. A 465 1 4 horse bunching sweeper and revolving broom.
No. A 418 14 in. Crane steam gate valve.
No. A 394 18 x 14 friction clutch pulley.
No. A 412 38 x 9 in. friction clutch pulley.
No. A 700 1 Buffalo jet condenser.

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We have a complete stock of all sizes and kinds. Write for list.

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CHICAGO HOUSE WRECKING CO., West 35th and Iron Sts., Chicago.

FOR SALE.**SPECIAL ENGINES.**

- 14 in. x 20 in. (Vertical) Slide Valve.
- 14 in. x 30 in. Keystone Corliss (Brand new).
- 11 in. and 19 in. x 24 in. Tandem Comp'd "Buckeye" (latest type) with condenser.
- 22 in. x 42 in. Wetherill Corliss.
- 23 in. x 48 in. Geo. H. Corliss make.
- 24 in. x 36 in. Mackintosh, Hemphill & Co.
- 26 in. x 60 in. Tange Bed type.
- Crane Elevator Co. Modern Elevator Engine.

BOILER.

- Horizontal Tubular, 72 in. x 16 ft., with 84 3/4 in. tubes, approved for 100 lb. pressure, complete.

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- Very fine forged shafts, finished all over, 10 in. diam. to 18 in.

FLY WHEELS. For Balance and for Belts.**SMOKE STACK.**

- Very fine steel self-supporting stack, 64 in. diam., 100 ft. high, with base casting, ornamental top and ladder.

HAMMERS.

- Hackney Cushion Hammer.
- 1200 lb. Double Frame Steam Hammer.
- 4 ton do.

SHEARS.

- New Alligator Shear with capacity up to 2 1/2 in. Cold Billets, or for Scrap cutting. Knives 14 in. long.

LOCOMOTIVES, New and Second-Hand.

*Signifies Right-hand.

†Signifies Left-hand.

B. M. EVERSON.German Nat. Bank Bldg. (6th and Wood),
PITTSBURG, PA.Sales Agent for
Baldwin Locomotive Works, Phila.**FOR SALE.****Immediate Delivery.**

- 2 30-in. gauge locomotives and 20 cars.
- 13 standard gauge locomotives weighing from 33 to 35 tons.
- 1 18 x 36 automatic Ball engine with 14 ft. band wheel, 26 in. face.

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Park Row Bldg., N. Y. City.

- 1 1500 H.-P. Corliss Engine. 1 200 H.-P. Corliss Engine.
- 4 180 Horizontal Tube Boilers. 4 100 Horizontal Tube Boilers.
- 1 125 H.-P. Horizontal Tube Boiler. 3 20 H.-P. Upright Boilers.
- 4 150 H.-P. each Wilcox and Babcock Boilers.
- 1 800 H.-P. Berryman Feed Water Heater.
- 1 Hydraulic Riveting Machine 86 in. gap. 1 Power Shears.
- 1 800 H.-P. Double Arbor Milling Machine.
- 1 48 in. Swing Lathe, Short Bed.
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- 8 New Woodward Pumps.
- 3 Pulleys, 7 ft. diam., 25 in. face, 55-16 in. bore.
- 1 Shaft, 20 ft. long, 8 1/2 in. diam.
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- 2 Double Belts, 104 ft. and 86 ft. x 18 in.
- Large lot of smaller sizes in prime order.

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One Compound Non-Condensing Dean of Holyoke Duplex Pump. Cylinders 30 x 80 and 16 x 24. Can be fitted for condensing on request. This pump has never been used, was built for an elevator system which was changed at last moment and pump was not needed. The capacity of this pump is 3,000,000 gallons per day against 200 pounds pressure. This pump can be bought very cheap. For further particulars, address

JEFFERSON IRON CO.,
Birmingham, Alabama.**NAIL MACHINES****FOR SALE.**

Five double end, four single end, Tumbling Barrels, Grinders, etc. All used less than one year.

Address "NAIL MACHINES,"

care The Iron Age, Fisher Bldg., Chicago.

WANTED.

Rivet Machines State make, capacity and price.

GARLAND CHAIN CO.,

Rankin Station, Pa

PLANNER FOR SALE.

An old but serviceable iron planer, 21 ft. long; bed 12 ft. long, 27 in. wide; opening 31 in. wide and 26 in. high. Sold for want of use. Price, \$400. Also an old style shaper for sale, \$75.

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- 1 Gray Screw Machine.

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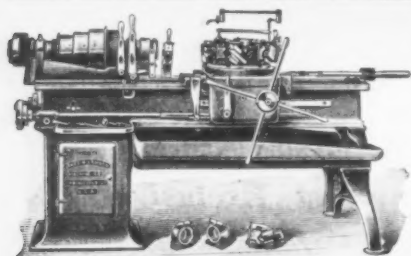
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SEE ADVERTISEMENT
PAGE 6.

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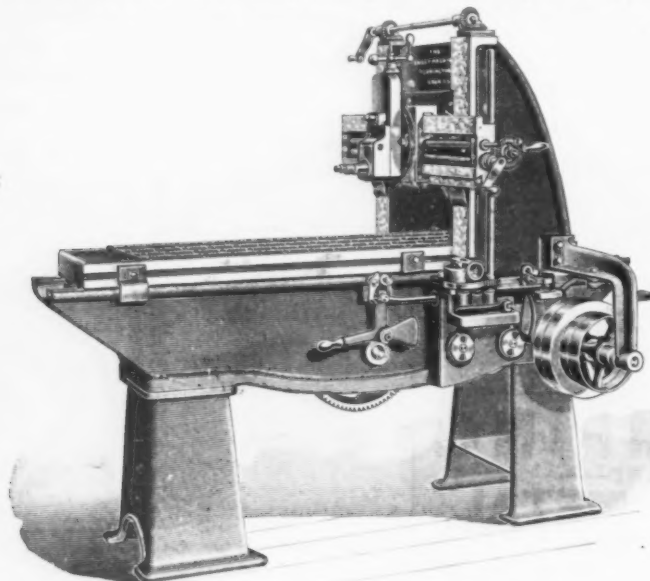
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We have recently re-designed our 16" x 16" x 4' planer in several important particulars with a view of presenting a machine that would meet the requirements of the most exacting of mechanics. No expense or pains have been spared to make this a machine that will plane perfectly true in every particular; each and every machine being brought to the degree of precision before it leaves our works.



It has a new departure in the way of feed mechanism. Very little power is required to drive this planer, as its feed mechanism is *frictionless*, and offers no resistance to the pull of the belts. Down feed is graduated to thousandths. This planer is finished in the same degree of excellence that is found on Hendey-Norton lathes and shapers. Net weight, 2,560 lbs. Send for catalogue.

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THE IRON AGE

THURSDAY, OCTOBER 18, 1900

Naval Architects' and Marine Engineers' Convention.

The eighth general meeting of the Society of Naval Architects and Marine Engineers will take place at the house of the American Society of Mechanical Engineers, New York, on November 15 and 16. The following papers will be read:

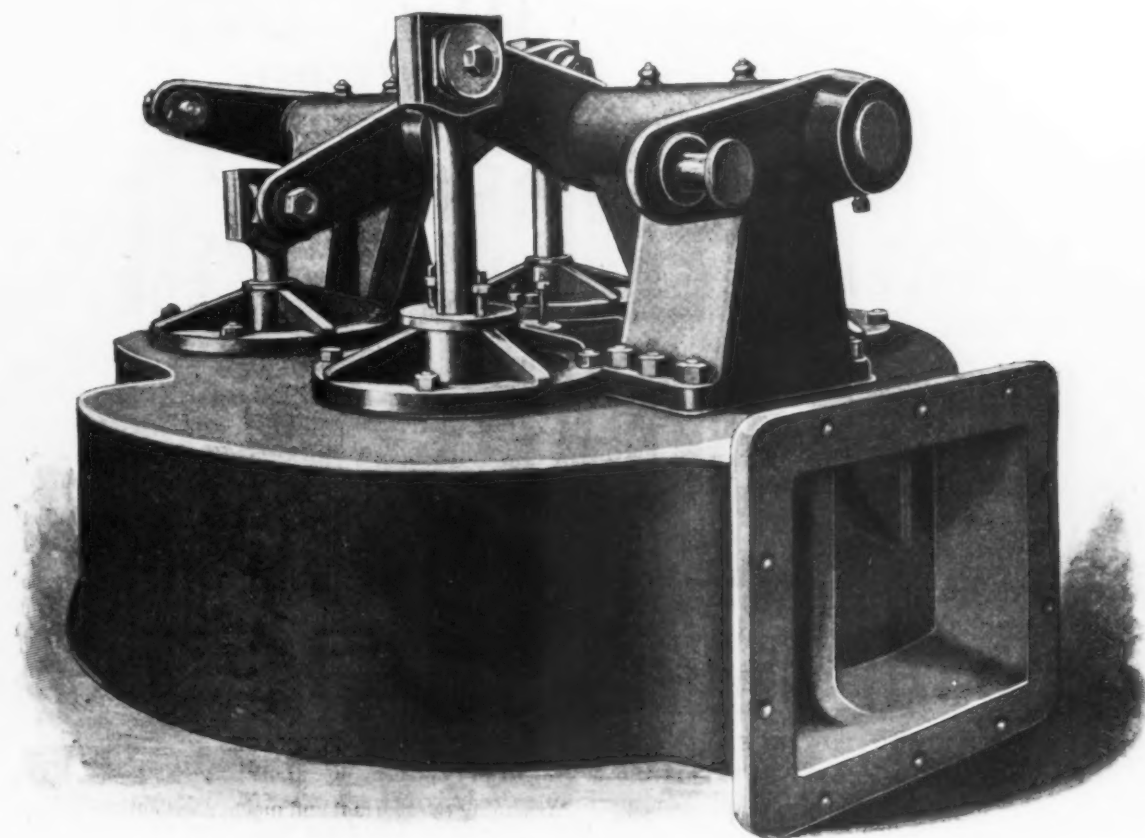
"Capacity Test of a Unique Form of Air Pump," by F. Meriam Wheeler; "Interchangeability of Units for Marine Work," by W. D. Forbes; "The United States Experimental Model Basin," by Naval Constructor D. W.

Battle Ship," by James Dickie; "The Safety of Torpedo Boats at Sea and in Action Under Various Conditions," by Naval Constructor Lloyd Bankson, U. S. N.

Heat and Power from the Waste Gases of Blast Furnaces.

BY F. W. GORDON OF PHILADELPHIA.

The results of an examination of what was then called the North Chicago Furnace No. 7, at South Chicago, Ill., by the writer was given by him in the paper



Blowing Cylinder Head.

HEAT AND POWER FROM WASTE GASES OF BLAST FURNACES.

Taylor, U. S. N.; "The Composition and Classification of Paints and Varnishes," by Prof. A. H. Sabin; "Tests of the Electric Plants of the Battle Ships 'Kearsarge' and 'Kentucky,'" by Naval Constructor J. J. Woodward, U. S. N.; "Coaling of the U. S. S. 'Massachusetts' at Sea," by Spencer Miller; "Notes on Recent Improvements in Foreign Shipbuilding Plants," by Assistant Naval Constructor H. G. Gillmor, U. S. N.; "Can the American Shipbuilder Under Present Conditions Compete with the British and German Shipbuilders in the Production of the Largest Class of Ocean Passenger and Freight Steam Ships?" by Geo. W. Dickie; "Classification Rules," by Theodore Lucas; "Recent Designs of Battle Ships and Cruisers for the United States Navy," by Chief Constructor Philip Hichborn, U. S. N.; "A Comparison of the Contract Prices of Our Naval Vessels," by Harrison S. Taft; "Launch of a Cruiser and a

read before the Halifax meeting of the American Institute of Mining Engineers in 1885, and the Journal of the Iron and Steel Institute in 1886. Table No. 2 of the latter paper gives the heat calories developed and utilized per pound of carbon burned in the furnace—that is, the carbon charged as fuel, less that taken up in the pig. These figures have herein been changed from calories to British thermal units, with which we are more familiar. The consumption of 1862 pounds of coke, during that examination, per ton of pig iron, being about as good as obtained in present practice, justifies the use of the heat appropriations, combustion of the gases, &c., then made in estimating the work to be expected from the gases of blast furnaces. That is, the heat units which might be applied to purposes foreign to the production of pig iron are arrived at by adding to their sensible heat the heat derived from their full combustion, and

deducting from this total the amount necessary for compressing and heating the blast, hoisting the stock and pumping the water required, according to present blast furnace practice. When the blast furnaces become a part of the steel plant there are ample uses to which this heat may be applied, and it becomes important that judicious economy should be exercised in heating and compressing the blast, &c., that a large surplus might be furnished, which, in its turn, could be economically applied in the conversion of the pig and rolling of the steel.

An endeavor is herein made to show what amount of heat should be used for the blast furnace, and what would remain after its full requirements are satisfied.

The paper referred to gives the composition of the waste gases by weight:

| | Per cent. |
|-----------------|-----------|
| CO ₂ | = 18.85 |
| CO | = 26.08 |
| N | = 55.06 |

Weight of gases per pound of carbon burned in the

degrees F., of which possibly 150 degrees will reach the stove.

The temperature of the blast received from the stoves is: $1375 - 150 = 1225$ degrees F. The heat of blast from the stoves = $1225 \text{ degrees} \times 4.61 \times 0.2375 = 1341.22 \text{ B. T. U.}$

Second.—Compressing the blast pressure at the engines, 12 pounds above the atmosphere. Weight of blast, 4.61. To compress 1 pound of air to 12 pounds, or 26.7 pounds absolute from 14.7 = 18,000 foot pounds.

The mechanical efficiency of engine is 87 per cent. The indicated foot pounds are 20,790.

$\frac{20,790}{778} \times 4.61 = \text{B. T. U. required to compress the blast} =$

123.2 B. T. U. The thermal efficiency of the engines is 15 per cent. (compound condensing). $123.2 \div 15 \text{ per cent.} =$ the total heat required by blowing engine = 821.3 B. T. U.

Third.—Hoisting material. Pounds weight of charge to pound of carbon burned = 4. Height, 90 feet. Foot pounds = 360.

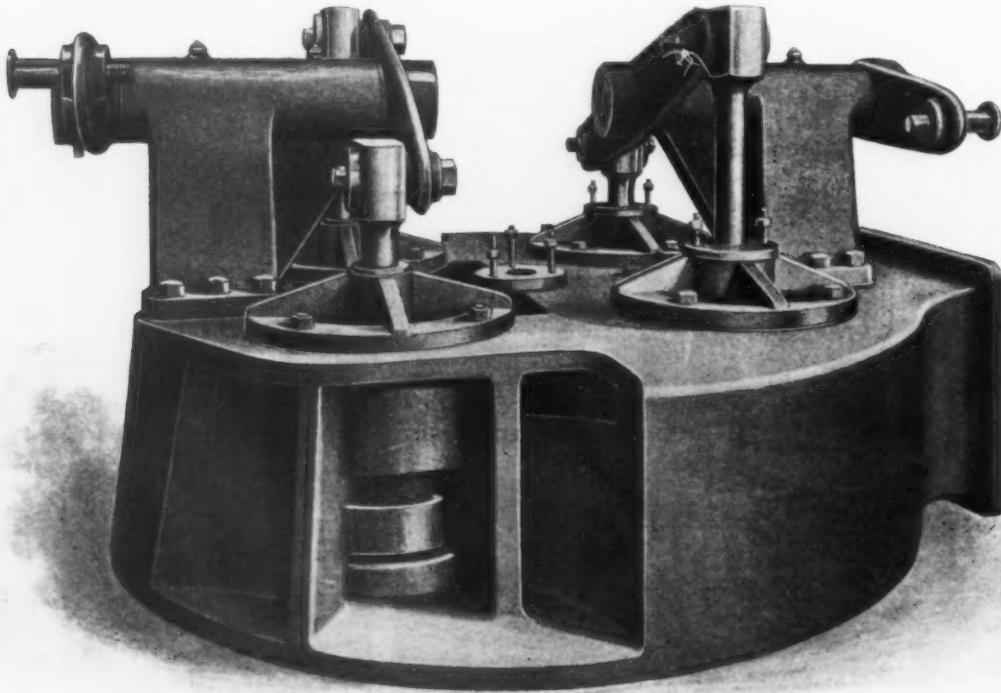


Fig. 2.—Blowing Cylinder Head

HEAT AND POWER FROM WASTE GASES OF BLAST FURNACES.

furnace (being carbon charged as fuel, less that absorbed by the pig) = 6.3 pounds. Of this

| | |
|-----------------|---------------------------------------|
| CO ₂ | = $6.3 \times 18.85 = 1.18755$ pounds |
| CO | = $6.3 \times 26.08 = 1.64304$ pounds |
| N | = $6.3 \times 55.06 = 3.46878$ pounds |

$$6.29937 = 6.3 \text{ pounds.}$$

Weight of C in CO..... $1.643 \times \frac{1}{2} = 0.7042$ pound.
Weight of O in CO..... $1.643 \times \frac{1}{2} = 0.9388$ pound.

$$1.6432 \text{ pounds.}$$

Units of heat generated by burning CO to CO₂ per unit of C = 10,093 B. T. U.

Units of heat generated by burning CO to CO₂ per unit of CO = 10,093 $\times \frac{1}{2} = 4325$ B. T. U.

Total heat from combustion of these gases, $1.64304 \times 4325 = 7106.15$ B. T. U.

Air required to effect this combustion, $0.9388 \times 4.276 = 4.015$ pounds.

Weight of gases when consumed, $6.3 + 4.015 = 10.315$ pounds.

Temperature of waste gases, 480° F.

Sensible heat in waste gases, $6.3 \times 480 \times 0.24 = 725.76$ B. T. U.

Heat in air used to burn gases (temperature 60°) = $4.015 \times 60 \times 0.24 = 57.82$ B. T. U.

Total heat of consumed gases, $7106.15 + 725.76 + 57.82 = 7889.73$ B. T. U.

Assuming 500 degrees F. as the temperature of the chimney gases from stoves and boilers, and 10 per cent. of the balance lost by radiation and convection, the heat of the gases transferred to blast and boilers ($10.315 \times 500 \times 0.24 = 1237.8$ heat units in the chimney gases) is 7889.73 - 1237.8 = 6651.93, less 10 per cent. = 5976.84 B. T. U.

First.—Of this heat the furnace requires for heating the blast to a temperature of 1375 degrees F.

The weight of the blast is 4.61 pounds. Temperature of compression (blast 12 pounds per square inch), 205

Assuming the thermal and mechanical efficiency of the hoisting apparatus as 3 per cent., B. T. U. required from boilers = $\frac{360}{778} \div 3 \text{ per cent.} = 15.42 \text{ B. T. U.}$

Fourth.—Pumping water used per pound of carbon burned, for tuyeres, bosh plates, hearth, 21.3 pounds. (See paper Iron and Steel Institute, 1886). To this add 25 per cent. for pig bed and feed water. Total = 26.6. May be raised 50 feet. Foot pounds = 1330, or 1.72 B. T. U. Efficiency of pump, 4 per cent. $1.72 \div 4 \text{ per cent.} = 43 \text{ B. T. U.}$

The total heat required for the furnace is: $1341.22 + 821.3 + 15.42 + 43 = 2220.94$ B. T. U. from a total of 5986.74, leaving a balance of 3765.8 B. T. U. that may be used elsewhere, thus showing only 37.1 per cent. required by the furnace.

The total theoretical, plus sensible, heat is 7889.73 B. T. U. The total heat found in the steam or in the blast is 5986.74. Then the estimated average efficiency of stoves and boilers is:

$$\frac{5986.74}{7889.73} = 75.75 \text{ per cent.}$$

In practice in the usual fuel fired boilers 75 per cent. efficiency can be obtained. When special care was directed to the effort 80 per cent. and better has been done. With a gaseous fuel under control, without the necessity of large quantities of air in excess to burn the carbonic oxide formed in the passage of the air though the incandescent fuel of boiler furnace grates, without the loss incident to unburned hydrocarbons, furnace

gases, under intelligent control, will show a higher efficiency than solid fuel. It may be contended that the presence of CO₂ in quantity will more than offset other advantages, and that the temperature of combustion will not be so high and convection so effective; but the fact is, a fairly well managed fire brick stove combustion chamber on gas has a temperature of 2600 degrees F. The writer is also well aware that furnace boilers set in the prevailing way do not give good results.

For each 300 tons of pig iron, say 24 hours' work of a furnace, the carbon burned in the furnace is equal, carbon charged, 483,600 pounds, less the carbon absorbed in the pig at 4 per cent., or 26,880, leaving 456,720 pounds. The heat units not required by furnace operations are:

$$3765.8 \times 456,720 \times \frac{1.5}{100} \times 778 = 4223.8 \text{ horse-power.}$$

Engines yielding 15 per cent. in thermal efficiency, or burning 1.8 pounds of coal per horse-power per hour, will consume 4223.8×1.8 pounds of coal, or a total of 7602.84 pounds, equal to 81.46 long tons, per day.

If the coal which this gas would replace should cost \$2 per ton on cars at mill, and there be added 50 cents per ton for unloading, firing and removal of ashes, the saving, if continuous for 24 hours for 300 days in a year, would be equal to \$61,095 per annum. It depends on the average number of hours in the 24 when these gases can be fully utilized to determine what actual part of the \$60,000 may be saved.

In arriving at these figures it has been assumed:

First.—The gases of the furnace will contain 26.08 per cent. by weight of carbonic oxide.

Second.—That it is practical to transfer 75.75 per cent. of the theoretical heat, plus the sensible heat, of these gases into the blast, or into steam.

Third.—That this steam may be so used in compressing the blast that the energy received by the blast will be 13.05 per cent. of that received by the boilers.

Fourth.—And that the final efficiency of pumps would be 4 per cent. and the hoist 3 per cent.

First.—The ratio of carbonic acid to carbonic oxide of 0.723 is the highest yet published that has reached the writer's knowledge. It is a close measure of fuel economy within the furnace, the materials charged being the same. Should the actual furnace fuel record not average less than 1862 pounds of Connellsville coke per ton of 2240 pounds of pig when smelting 60 per cent. ores, it is safe to assert that the gases contain at least 26.08 per cent. of carbonic oxide. In fact, this gas is as poor a heating gas as any likely to be met with.

Second.—Eighty per cent. efficiency has been obtained from boilers burning coal, but 75 per cent. should be obtained from any good fuel, especially if the rate of combustion is constant, or the fuel and air supply, instead of the draft, could be regulated, as it should be in burning gas.

The chief losses in burning fuel are:

Sensible heat in the chimney gases.

Radiation, convection and infiltration.

Partially burned carbon shown as carbonic oxide in the chimney gases.

Hydrocarbons in the chimney and fuel in the ash pit.

The fuel may equal 14,000 B. T. U., the weight of gases per pound of fuel 0.24, the temperature of the chimney 400 degrees F., and the atmosphere and coal at 60 degrees F.

| | |
|---|-----------------|
| Sensible heat in chimney gas..... | 1694.4 B. T. U. |
| Radiation and convection, 7 per cent..... | 989.0 B. T. U. |
| Miscellaneous..... | 825.6 B. T. U. |

Twenty-five per cent. loss.....3500.0 B. T. U.

The first two items of loss are 19.1 per cent., leaving 5.9 per cent. to be accounted for in the coal in the ash pit, hydrocarbon and carbonic oxide in chimney. With little, but intelligent, attention 95 per cent. of the carbonic oxide of the furnace gas can be consumed in fire brick stoves. When using 10 per cent. excess of air:

| | |
|---|---------|
| Ninety-five per cent. of CO yields 706.15×95 per cent..... | 6750.09 |
| Sensible heat in gases..... | 725.75 |
| Sensible heat in air (10 per cent. extra)..... | 63.60 |

| | |
|--|------------------|
| Total heat per unit of C burned..... | 7540.25 B. T. U. |
| Waste heat in chimney gases, $10.716 \times 500^\circ \times 0.24$ | 1285.92 |
| Radiation and convection at 7 per cent..... | 527.8 |
| | 1813.72 |

Net, 75.9 per cent.....5726.53 B. T. U.

Having taken a favorable view of fuel fired boilers with 400 degrees F. in chimney and a low miscellaneous loss of 5.9 per cent., the gas fired boilers (with combustion assumed equal to that in the stoves) figure their equal in efficiency, notwithstanding the large per cent. of diluents in the furnace gas and that its fuel has been partially burned. This results from their high initial temperature and the fact that the carbonic oxide can be so thoroughly burned with a small excess of air, while in burning coal a heavy weight of hot chimney gas has to be raised from the atmospheric temperature.

It is difficult to determine by experiment or by difference the heat lost by fire brick stoves through radiation and convection (there being no infiltration).

The stove's external surface is smoother than boiler settings, having less actual surface to the foot of measured surface, yet the measured surface is much smaller than in a modern boiler setting, where we use the same weight of gas with the same economy; and though the boiler may be well housed and the stoves exposed, the inference is that the percentage of these losses estimated for boilers is sufficient for stoves.

Economy of the Blast Engine.

The best record for large compound condensing engine is 12.223 pounds of steam per indicated horse-power per hour. Steam, 140 pounds gauge and 20.4 expansions. This equals $\frac{1192}{60} = 19.87$ thermal units per minute used by engine for each pound of steam per hour.

$$42.4164$$

$$18.715 \times 12.223 = 18.54 \text{ per cent. thermal efficiency.}$$

Had this engine used ten expansions the efficiency would have fallen to 17.2 per cent.

This range in expansions is equivalent to a range of horse-power from 100 to 150, corresponding to a range on blast pressure from 8.8 to 14 pounds per square inch.

If the changes in blast pressure should average the mean of these pressures, and change slowly, the mean thermal efficiency would be 17.87 per cent., or 2.87 per cent. above our estimate. This provides an ample margin for feeding the boiler and losses in steam transmission. Besides, it is not expected that an engine in use will work up to the record.

The 87 per cent. mechanical efficiency is a record from an engine of moderate dimensions, and should be improved upon by well designed and well built blowing engines.

The low efficiency assumed for the pumps and hoist and the small total power required for this work compared to heating and compressing the blast will permit of admitting their total heat requirements.

Referring to the estimate of boiler efficiency, the gas combustion in fire brick stoves was mentioned instead of that under the boilers. No good record of combustion under boilers is known, nor has the writer ever examined an apparently good combustion that was found to be good. All he knows of are bad, bad by faulty design of the setting, and no amount of attention can effect good combustion.

If practically complete and perfect combustion can be effected in a stove's combustion chambers, the heat emanating therefrom may be transferred to water in a boiler as effectually as to the bricks of the stove.

Gases with but 26 per cent. of their weight combustible, with but 1128 B. T. U. per pound mass, may readily be checked in combustion, and the cry of bad gas is raised. There is no such thing as bad gas—all gas contains a high percentage of carbonic oxide. Sometimes it is hot and will burn in the poor chambers provided, at others it is cold and goes out, except supported with fires. But it will always burn if it is as dry as the furnace furnishes it and if given a chance.

Checks to combustion are proximity of the chilling surfaces of the boiler, lack of sufficient space in a hot chamber for expansion during combustion, and want of draft to carry away the products.

To promote and support combustion a thorough mixing of the gas and air on entering is required, and the combustion chamber, while being very deep and large, must be heavily lined with fire brick, and while at work have no openings except those for gas and air.

By complete and perfect combustion it is understood that all the carbonic oxide is consumed, and no extra air is required to do it. This is too nice an adjustment, even if it were possible. What is desired is the closest approach without too close attention.

It has long been estimated that 10 per cent. excess of air may be used, but 20 per cent. excess, if with it 100 per cent. of the carbonic oxide was burned, would furnish more heat. It is not too much air that is to be guarded against in practice; it is too little.

Compare 20 per cent. less air used than required to fully consume the carbonic oxide of the gases with 20 per cent. excess. The heat attained with 80 per cent. of that chemically required would be:

| | |
|---------------------------------|---------|
| $7106.15 \times 4 + 5$ | 5684.92 |
| Sensible heat in the gases..... | 725.76 |
| Sensible heat in the air..... | 46.25 |

| | |
|---|---------|
| Less heat in chimney gases at 500°..... | 6456.93 |
| | 1117.32 |

Net B. T. U.....5339.61

$6651.93 - 5339.61 = 1312.32$, or 19.71 per cent. less than total from perfect combustion.

Should 20 per cent. excess of air be used in burning the gas, the net heat would be:

| | |
|---|---------|
| From combustion..... | 7106.15 |
| Sensible heat of gas..... | 725.76 |
| Sensible heat of air..... | 69.38 |
| | <hr/> |
| | 7901.29 |
| Less heat in chimney gases at 500°..... | 1334.16 |
| | <hr/> |
| Net B. T. U..... | 6567.13 |

6651.93 — 6567.13 = 84.8, or 1.27 per cent. less than perfect combustion. A liberal excess of air would be the better practice, were it not that in lowering the temperature of the mixture of gas and air by increasing the air the union of the carbonic oxide and oxygen is rendered more difficult, always bearing in mind the low calorific power of the gases, but in noting the great loss due to a lack of air and the small loss from an excess, the most careful provision should be made to facilitate combustion. Preheating the air used in combustion is com-

That the blowing engines may return 10 per cent. of the theoretical heat in the gases, or $15 \times 87 \times 75$ per cent. = 9.7875 per cent., they must have good compression, steam and exhaust lead, and good piston speed; the blowing cylinder have small clearances and a free inlet and discharge.

Good piston speed may be dispensed with if thorough steam jacketing is provided; but if the blast end is properly designed and high rotative speed unobjectionable, then increased capacity may be had for the same outlay. Any blowing engine having the steam and air piston action coincident and valves set for economic steam consumption compresses the steam, has steam lead and is discharging the blast against the momentum of the fly wheel. These are all forces tending to rend the engine, and to assist these forces a water ram may occur, for a vertical cylinder is a good water trap on its upper end. Hence engines of this type should have limited expansion;

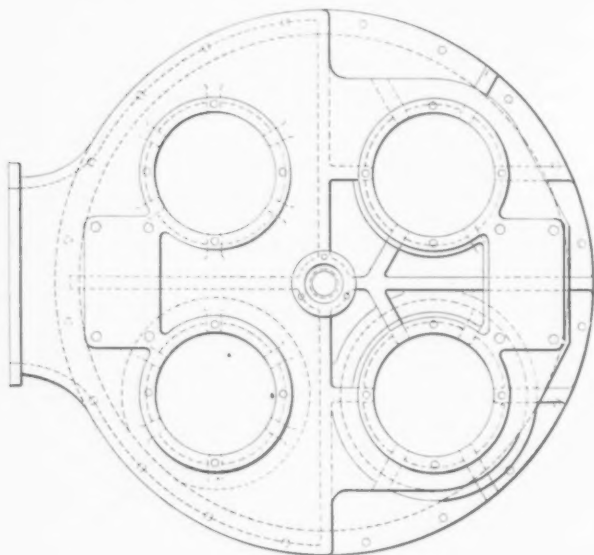


Fig. 3.—Head with Valves, Levers and Covers Removed.

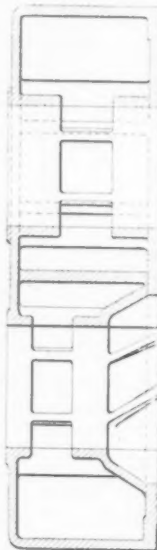


Fig. 4.—Section through Discharge Chamber.

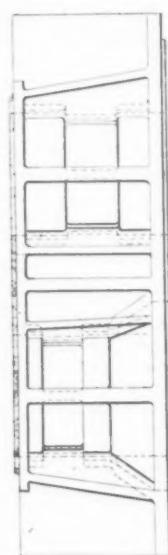


Fig. 5.—Elevation, Showing Air Inlets.

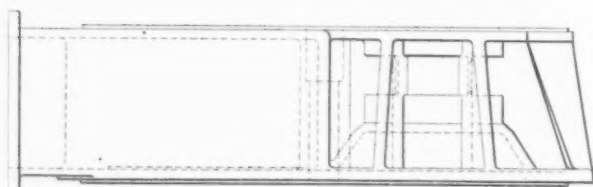


Fig. 6.—Side Elevation Fig. 3.

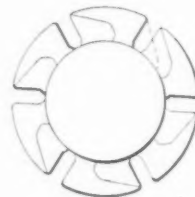


Fig. 7.—Plan of Valve Chamber Looking Toward Bottom of Head.

HEAT AND POWER FROM WASTE GASES OF BLAST FURNACES.

mendable, but not by robbing the heat from the combustion chambers.

The failure to derive any great advantage from the excess of heat in the blast furnace is due to lack of appreciation of its value. The subject has not been followed up. If furnace owners believed that, with day and night use of the gas from a 300-ton furnace, coal at the rate mentioned could be saved worth \$60,000 in one year, the subject would receive attention, and results herein obtained figured out.

That perhaps every engine in the steel plant can be run from the furnace boilers, together with the blowing engines, pumps, &c., of the furnace, while enough gas is diverted for heating the blast, will not be taken for granted. But with good combustion, ample stove surface, that their chimney gas may be kept at a low average temperature; with well set boilers of ample surface, carefully tended and cleaned inside and outside; with blowing engines developing in compressed air the equivalent of 10 per cent. of the heat in the gases burned to raise the steam these engines consume, and with the surplus steam economically distributed and used, the total steam work of a steel plant may be done without burning any coal for steam, while the furnaces are working well.

no steam lead, no compression and slow exhaust if these strains are to be minimized. They are then uneconomical and if otherwise set will thump and break, even though of double the strength of engines with cylinders of the same diameter using steam at the same pressure. These steam end strains exist in all economic steam engines, the blast end strains in all blowing engines, but they do not act coincidentally.

A horizontal compound condensing Corliss engine, with its usual admirable draining quality, when the exhaust has good lead, may rotate a shaft, and within itself be subject to only such strains as all such engines have to resist, while vertically over each end of its shaft is set a blowing cylinder. The strains are divided, each acting through separate parts. Such an engine may be run at a high rotative speed and the steam end do its work with as little steam as any record when the blast pressure furnishes its most economic load. As, however, this load does not fluctuate quickly nor often, a high rate of economy may be maintained. It is true that the entire duty of the engine is transmitted through the shaft, as in all marine and most other engines; but these strains, though more continuous, never are so great as in ordinary blowing engines.

The engravings show a blowing cylinder head

eminently suited for high speeds. The head from which the photograph was made was shipped to the Blast Furnace Power Syndicate, London, England. The engine of which it forms a part consists of a vertical single acting cylinder, 72 inches bore and 28 inches stroke, driven at 160 revolutions per minute by two horizontal gas engines fed by furnace gases. A gas engine is on each end of the shaft. They have alternate explosions every second revolution, while the blowing cylinder has a compression every revolution, or there is an explosion to each compression, thus minimizing the power required from the fly wheel.

Description of Blast Cylinder Head.

Figs. 1 and 2 show a blowing cylinder head.

Fig. 3 shows head with valves, levers and covers removed.

Fig. 4, section through discharge chamber.

Fig. 5, elevation showing inlets for air.

Fig. 6, side elevation.

Fig. 7, plan of valve chamber looking toward bottom of head.

Fig. 8, plan of valve from inside of cylinder.

Fig. 9, plan of valve from outside of cylinder.

Fig. 10, plan of head, showing rock arms.

Fig. 11, section through center of delivery valves, showing valves at line and line.

Fig. 12. Diagram of delivery valves.

Two valves of equal area, actuated from opposite ends of rock arm, accurately balance each other in pressure, current and weight.

an exactly similar pair are for the discharge. The inlet valves are actuated by an eccentric on the main shaft,

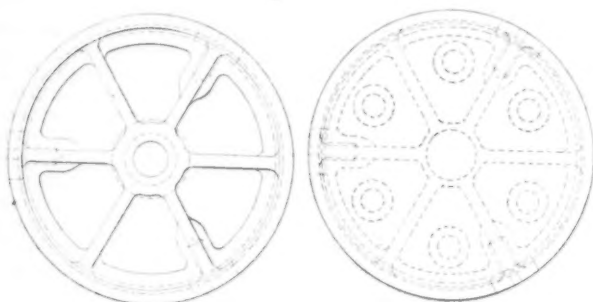
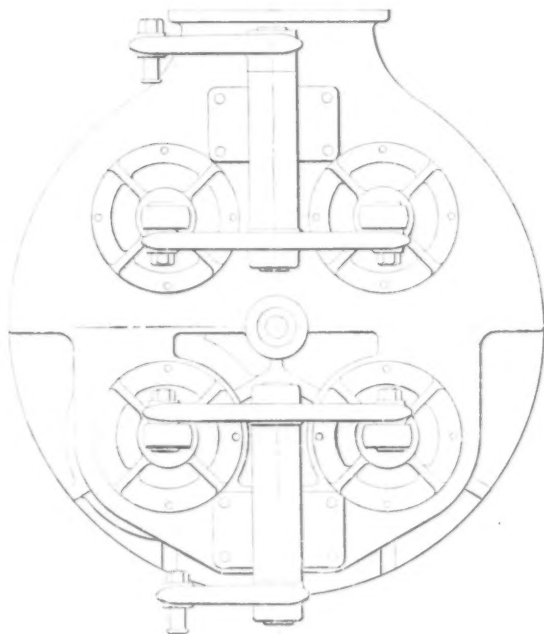


Fig 8 — Plan of Valve from Inside of Cylinder.

Fig. 9.—Plan of Valve from Outside of Cylinder.

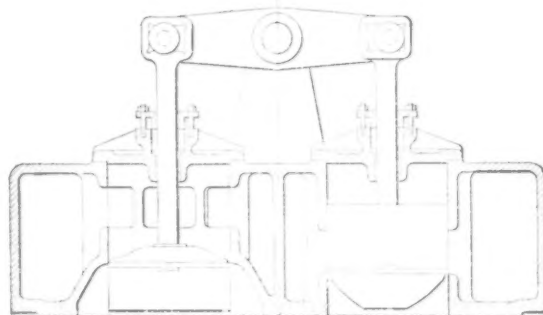


Fig. 10.—Plan of Head, Showing Rock Arms

Fig. 11.—Section through Center of Delivery Valves, Showing Valves at Line and Line.

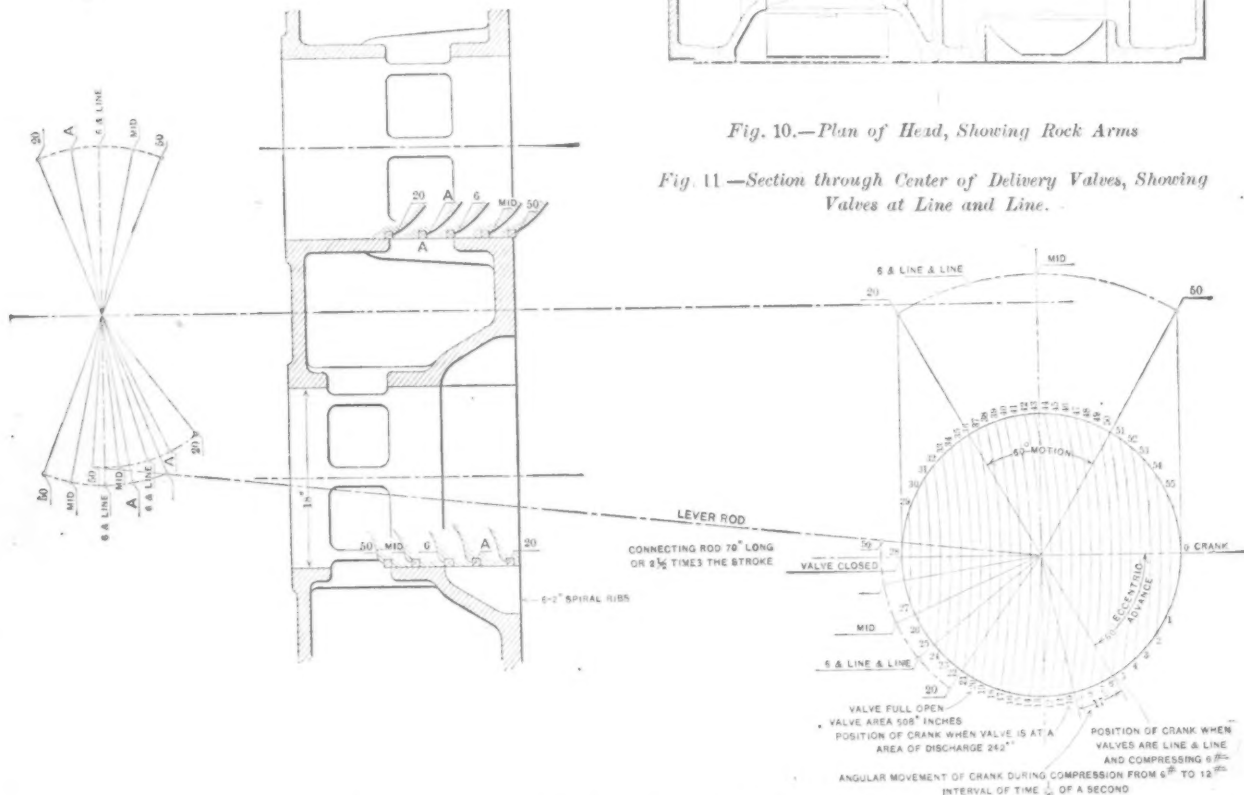


Fig. 12.—Diagram of Delivery Valves.

HEAT AND POWER FROM WASTE GASES OF BLAST FURNACES.

The only resistance to overcome is their sliding friction and the rotative friction of the rock arm shaft and pins. Two valves so balanced act as one for the inlet, and

set at 88 degrees in advance of the crank, and arranged to close line and line at dead center, and open when the compressed air in the clearance has expanded to at-

mospheric pressure. Eighty-eight degrees accomplishes this nicely, as the clearance of this short stroke cylinder is but $1\frac{1}{4}$ per cent., and a piston's recession of 0.3 inch at 12 pounds discharge pressure will suffice.

The discharge valves are actuated by a separate eccentric, set at 60 degrees advance of the crank, through a wrist plate action common to Corliss engines, and while these valves close line and line at dead center, they are line and line to open when the air is compressed to 6 pounds in the cylinder, the designed pressure in discharge chamber being 12 pounds.

The crank pin is at 6 (see Fig. 12) and must move through 17 degrees (or to $9\frac{1}{2}$) further, that by the piston's advance a pressure of 12 pounds may be generated. In the meantime the valves have moved to A and provided an opening from the cylinder to discharge chamber of 242 square inches, and they will continue opening as the piston advances till the crank pin reaches 20, when the outlet area will equal 508 square inches just as the piston has attained its highest velocity.

During the movement of the crank pin from 6 to $9\frac{1}{2}$ the pressure is rapidly increasing in the cylinder, due to the advance of the piston. It requires but 1-56 of a second to travel these 17 degrees—a space of time too limited for the air in the discharge chamber to overcome its own inertia and flow into the cylinder against the rapidly increasing pressure there.

It was shown by diagrams, in a paper read by the writer before the Washington meeting of the American Society of Mechanical Engineers, 1889, that with this time extended to 1-39 of a second, and with the discharge valve suddenly opened before the cylinder acquired half the discharge pressure, the air entering the cylinder from the discharge chamber did not increase the work of compression more than one-half of 1 per cent., and that this early opening of the discharge valve kept the cylinder pressure down to that of the discharge chamber, saving power and strains.

Although these valves have the moment of opening fixed when the compression in the cylinder is at 6 pounds above the atmosphere they are best suited for blowing against 12 pounds, but the range of pressure against which they will operate is by no means limited. At 6 pounds they will work as well as ordinary blowing engines, and give just such a card. Blowing below 6 pounds the pressure in the cylinder will rise to 6 and above, and then fall to the required pressure as the valve opens. Above 12 pounds more air will enter the cylinder from the discharge pressure, but the wide range of 6 to 20 pounds can be obtained, showing excellent compression.

The piston speed of the engine is 747 feet per minute, one end of the cylinder taking in and discharging 10,546 cubic feet per minute, large valves are required to get atmospheric pressure in the cylinder during suction. Each valve is 18 inches in diameter; two for the inlet have an area of 508 square inches, or one-eighth the area of the cylinder, and that this area may be maintained, the opening movement of each valve is $6\frac{1}{8}$ inches.

Such a compression cylinder, meeting the views of the engineers using gas engines as motors at the high speed of 160 revolutions per minute, will meet all the requirements for steam driving where the highest steam economy and lowest power for compression is demanded.

Pacific Coast News.

SAN FRANCISCO, CAL., October 8, 1900.—Trade in almost every line of merchandise still continues good, and in the hardware and iron and steel business especially there is no place of business that you can enter where every one is not as active as he can possibly be. The condition of business is reflected in the bank exchanges, which are still larger than were those of 1899 in the fall, though at that time they were very much larger than for the same time in 1898. The increase this year is about 8 per cent. There is a conspicuous lack of tonnage for the wants of shippers. The railroad has had to supply itself with a very large additional number of cars for the transportation business by land, while the shippers by sea have not been able to obtain accommodation for a long time past. For instance, the "Moana," which sailed last week for Sydney, had to leave behind 3000 tons of freight, and the next steamer for Australia will not be able to take all the freight offered. There is always more or less freight for Sydney shipped via Victoria or Vancouver, but those who tried to ship in that way had to be refused also. It has been the same in the China lines and the Panama line. The advent of the Kosmos line, however, has changed matters here. Still the other day an extra steamer, the "Barracouta," had to be laid on to Panama to carry the wine offered for New York. A reasonable proportion of the freight consists of hardware, iron and steel, wire, iron pipe, and, though last not least, machinery.

It is not the first time that machinery for transportation to Australia has had to take its turn of waiting. In fact, all San Francisco needs to develop trade with the Orient and the Australias and the Pacific Islands is a series of lines of powerful steamships of 8000 to 10,000 tons burden. The success of the Kosmos Line shows what can be done in that way. We will soon, however, have some powerful steamships from the East to be placed on the route to Australia, so that we shall have better accommodation for shippers. The case of the line to Hamburg, already referred to, proves that the steamers help to develop trade that without them would have no existence.

The export trade in hardware, iron, metals, machinery, &c., with the Orient, though in some lines rather backward, is growing steadily. The last two steamers, the "Nippon Maru" and the "City of Rio de Janeiro," took out a great deal. The "Nippon" had machinery valued at \$9968, hardware at \$2904, railroad supplies at \$3000, 209,137 pounds of steel plate valued at \$8050, 417 bicycles, \$12,675; 2000 kegs of nails, \$6180, and blast furnaces, \$2135. The "City of Rio" had typewriters, \$2790; bicycles, \$5933; machinery, \$3154; surgical and hardware, \$1455. The "Moana" had machinery, \$20,136, and electrical goods, \$4121. The totals of the above are as follows: "Nippon Maru," \$49,825; "City of Rio de Janeiro," \$14,330, and "Moana," \$24,713, a grand total of \$88,868. This is a pretty good total for three steamers. Most of the cargoes of the first two was for Japan, though some was for China, and some of the machinery for Vladivostok. In the case of the "Moana," the machinery was divided almost equally between Australia and New Zealand, while all the other goods were for Australia.

The battle ship "Wisconsin" has been heard from on her trip north in a way to reflect the greatest credit on the coast and on her builders. She made the run down from Seattle to this city in 58 hours. On her way upon Saturday, September 22, she struck a fierce gale, and proved herself a wonderful sea boat, obeying her helm as readily as a yacht. During the storm she ran ten knots, although some of the big seas went as high as her turret. The builders are confident that she will average considerably above 6 knots, which is her contract rate of speed. She will next take a run in the Santa Barbara Channel, south of the city, starting to-morrow. From what she has already done there are no doubts entertained as to the result.

This is the year of strikes, apparently, and we are in the midst of a small strike here, a sort of tempest in a teapot, in the tinware shops. It has now been on for about a week, and no doubt will have petered out altogether in a very little while. It is the outcome of the eight-hour day movement now in progress throughout a greater or less part of the United States. Some time since a strike started up in the planing mills, which is still on, where the millmen sought to obtain an eight-hour day. This was an attempt to stand on the same footing as the building trades, which had already obtained the eight-hour day. Of course, the matter could not stop there. The workers in all of the local establishments engaged in the manufacture of tinware and light sheet iron goods some months since notified these firms that on October 1 and thereafter they would only work eight hours a day. This was to be at the old wages of \$3 a day. Not much attention was paid to the matter, but on October 1 the strike was in full blast. As to its condition at date, a representative of W. W. Montague & Co. stated that at present there were only 40 men out in their establishment, and that the firm were going to run their business in their own way. Another representative of this firm said that they had kept their men at work during the dull times when everything in the city was at a low ebb, and he did not think that the present action of the men could be justified. A representative of Holbrook, Merrill & Stetson said that there were only four men out in their establishment, and he seemed to make light of the affair anyway. J. O. L.

A compromise has been effected in the case of the Trussville (Ala.) Furnace, Mining & Mfg. Company against Rogers, Brown & Co., in which the plaintiff asked for \$100,000 damages, owing to the refusal of the defendants to continue their contract with the Trussville concern. It was alleged that under the contract Rogers, Brown & Co. were to take the entire output of the Trussville Furnace for the year 1900, but gave notice they would not take any more iron after July 1. This the defendants aver was on account of the inferior quality of the iron being furnished, and because of which they claimed they were greatly damaged, being unable to make deliveries of the grades sold their customers. As the result of the compromise the Trussville Furnace contract is canceled and the Williamson Furnace contract modified.

Suggestions for the Improvement of Rolling Mills.*

BY LOUIS KATONA, RESICZA, HUNGARY.

Speaking generally, in the rolling mill four distinct factors are to be considered. These are: the engine or driving motor, the fly wheel which compensates for the irregular action of the engine, the power transmission gear, and the rolls themselves. Great improvements have been made in all these parts, but certainly more attention has been paid to perfecting the steam engine. Nevertheless the steam engine is not in itself altogether suitable for the purpose, inasmuch as fly wheels have to be used, or two or three cylinders have to be coupled onto one crank shaft in order to overcome the effects of the varying pressure of steam when high expansion ratios are in use, as in modern practice. In comparison it may indeed be said that the alterations in the gearing and in the rolls have been but slight. In the rolling mill the cross section is diminished step by step, and at the same time the length of the material under treatment is increased by submitting the work to the consecutive operation of a number of passes. These passes are formed in three or four sets of rolls, and in two or three high mills, so that the multiplication of the mills necessitates much reduplication of the gears. Among the defects due to this may be mentioned the slackness in the couplings, the play between the pinions, the unprotected situation of the bearings and the difficulty of adjusting the grooves, besides which there are many other points that will readily occur to any one in charge of a rolling mill.

At the present time there at least three types of mill in general use—viz., pull over or two-high, non-reversing mills with fly wheels, three-high mills with fly wheels, and two-high reversing mills. Each of these is used for rolling all sorts of shapes and sizes, but in all of them the above mentioned defects occur, and it is intended in this paper to suggest some means for counteracting them.

In rolling iron and steel as considered below, all the preceding and subsequent metallurgical processes will be neglected, and attention will be mainly confined to two points—the consumption of power and the waste of fuel and material. The size and weight of the raw material for the production of a given section of iron or steel is limited unconditionally as regards rolling mills now in use, and there does not appear to be much prospect of great improvement in this direction for the present, although altered conditions often produce unexpected results. A very different state of things is seen, however, when consideration is given to the possibility of altering the ratio between the total amount of power used in driving and the proportion which is absolutely used in reducing the cross section of the work. In other words, it may be possible to greatly increase the efficiency of the rolling mill.

Wastes in Present System.

The great defect of the present system of rolling mill plant lies in the enormous masses that have to be set in motion to no effect. At any moment the only part of the mill which does useful work is the particular groove through which the metal is passing. All the power consumed in driving the rest of the mill is so much wasted energy. This includes all the power expended in the idle rolls, the couplings, the gearing, and in the fly wheel used in two and three high rolls.

Indicator diagrams were taken from the cylinder of an engine driving a two-high mill provided with a fly wheel and rolling beams 220 mm. deep. Running unloaded at 60 revolutions per minute, the horse-power developed was 81.3, which served to keep the engine, rolls, gearing and fly wheel in steady motion. Calculated from the frictional pressures, &c., the amount was 87.2 horse-power. When fully loaded, eight diagrams from the same cylinder showed 284.3, 269.2, 288.5, 296, 342.5, 366.5, 352 and 401 horse-power, or an average of 325 horse-power. The requirements of power, speed and all other conditions remaining constant, this shows that no less than 25 per cent. of the average power is consumed in driving the great masses of the mill.

A second train used for rolling merchant iron was tested when producing hoop iron. It consisted of four three-high sets of rolls in one line and 12 three-high sets in another line. When running idle the power absorbed was 68.8 horse-power. When the hoop iron was passing through the grooves 28 indicator diagrams gave the following figures: 238, 231.8, 246.5, 236, 236.5, 93.7, 101.8, 127, 82.2, 108, 113.6, 112, 129.6, 235, 272, 259, 254, 247, 254, 193, 179.2, 260, 164.8, 195, 218, 208.5, 128, 132.8, an average of 187.7 horse-power. Here also all the conditions were uniform excepting the work done, and so it

is evident that 36.6 per cent. of the average development of power was taken for revolving large dead weights.

Beyond this, however, there is another factor to be taken into consideration. The engine is only called upon to exert its maximum power during part of a loaded run, partly in consequence of the unequally distributed pressure in the successive passes and partly on account of the difference in temperature between the ingot and the finished work. The greatest power is called for when the material is in the last finishing passes, whether it consists of girders, rails, angles or other shapes, hoop iron or wire rod. Thus, from a minimum of 25 per cent., the loss increases with the number of the sets of rolls and with the ratio of the weight of the rolled material to the weight of the machinery, so that it may reach 36.6 per cent., or even 40 to 50 per cent. in some cases. It may even happen that the useful work is occasionally only a small percentage of the total. As far as the author is aware, numerical data of this character have not been published hitherto, but the great care taken in lubrication of the rolls shows that every one is well aware that serious losses of power do exist.

The second great defect in the arrangement of rolling mills is that more or less of the total number of revolutions are wasted as far as useful work is concerned. During the operation of rolling rails on a three-high mill, for instance, some time is lost in raising the ingot after it has passed the first groove so that it may enter the second pass, and further time is taken in shifting it laterally to the third pass, and so on. All this time the rolls and the fly wheel are being driven with the expenditure of steam. It is true that the steam consumption is less, but a little calculation shows somewhat surprising results as regards the waste of power during these idle intervals. In order to appreciate the losses in their right measure the different types of mills must be considered separately.

Time Occupied in Actual Rolling.

Two-high mills with fly wheels are used at several works for rolling angle, tee and other sections of small and medium sizes. New mills of this type are not built at the present time, but the existing plants are not being replaced. The number of loaded revolutions of such a mill is very small, and the same statement is true of the non-reversing plate mill. In one case the total number of revolutions of the engine, when I-beams 280 mm. deep were being made, was 6010, but of this number only 540 revolutions, or 9 per cent., did useful work as calculated by the total length of the material rolled. On another occasion the total number of revolutions was 5537 when making plate billets, and the useful number 404, or 7.3 per cent. On non-reversing mills producing plates 3 to 6 mm. in thickness and 1 x 2 or 3 m. in area, the total number was 827 revolutions, of which only 47, or 5.7 per cent., did the necessary work.

Three-high mills with fly wheels are in general use for producing the most different sections of iron and steel. In smaller sizes as high speed trains they make common merchant iron, hoop iron and wire rod; in larger sizes they produce beams, rails and other large sections; as plate mills their work is to manufacture sheets, boiler and ship plates, &c. The loaded run changes according to the shape and size of the rolled pieces and their longitudinal dimensions, and according to the nature of the appliances and machinery at hand. The method of making the observations being the same as before, three-high trains show 37 per cent. as their proportion of loaded run to the total runs under favorable conditions when producing beams of symmetrical section which do not require any turning. With skilled and careful workmen, doing all the work by hand, the average, as a rule, remains under 30 per cent. When producing channel iron which has to be turned after each pass the loaded runs decrease to 21 per cent.

On three-high mills of medium size producing lighter sections or merchant iron the number increases from 50 per cent. up to 75 or 80 per cent., depending on the skill of the work people and the length of the rolled pieces. On the lightest trains rolling hoop iron or wire rod it may attain to 90 or 95 per cent. But as the ratio of loaded runs increases favorably to the total runs on these trains, the first mentioned defect—i. e., the largeness of dead weight revolved—steadily increases in proportion. These light trains consist, as a rule, of 8 to 16 sets of rolls, each set having three rolls and a corresponding number of couplings. The weight is sometimes augmented by spur wheels or belt gearing interpolated for the sake of raising the circumferential speed of rolls. When the work is in the last set of rolls the pressure is increased not only in the bearings of those rolls, but also to some degree in the bearings of every roll, in consequence of arrangement of loose couplings, and hence the loss of power increases in proportion as the ratio of unloaded runs is improved.

On three-high mills it is customary to manufacture plates from 20 mm. down to 0.4 mm. in thickness. The length and width of these plates do not differ greatly,

* Abstract of paper read before the Iron and Steel Institute of Great Britain.

boiler, ship, &c., plates or sheet iron, black and tinned, for example. According to their dimensions and their quality the handling may require more time than usual after each pass. It will be necessary to enter them into the rolls alternately in the direction of their length and width, to examine their surfaces carefully after each passage, and to measure the length and width as well as thickness more frequently. The percentage of loaded runs will decrease as an effect of these precautions. Under favorable conditions the ratio can go up to 15 or 20 per cent.; in sheet iron trains, as a rule, it remains at 7 to 20 per cent.

In those types of trains with two and three high rolls combined the double two-high trains are in the middle between the simple two and three high trains. The ratios vary with the section and other dimensions of the pieces rolled, and with other factors mentioned above. In certain cases they may be as high as 55 per cent. in the combined trains of two and three high sets, or 60 to 70 per cent. in double two-high trains. However, as the ratio of loaded runs improves the amount of dead weight driven also increases, as is characteristic of the light merchant trains.

Reversing mills work, as a rule, without fly wheels, though a fly wheel has been used, as Mr. Ledebur states, but it did not come into general use. This type of mill may be used to produce any of the larger sections, such as rails, I-beams, constructional plates of great length, boiler and ship plates, &c., but their special use is for cogging ingots. The ratio of the loaded runs is closely dependent on the section and on the efforts directed to

may be given as follows: Girders or other section iron on two-high trains, 1700 pounds; rails on three-high mills, 968 to 990 pounds; I-beams on the same train, 1400 to 1500 pounds; constructional plates of greater length or I-beams and axles on reversing trains respectively, 1870 to 1980, or 1320 to 1540 pounds; on commercial and high speed trains, 2200 to 4400 pounds. Of course the quantity used will vary with the quality of the coal, but the value of the coal and the pecuniary equivalent of the waste will both depend on its caloric value.

| Rolls and products. | Coal consumption per ton. | Unloaded runs. | | Loaded runs. | | Loaded runs. | | Coal wasted. | |
|----------------------------|---------------------------|----------------|-------------|--------------|---------------|--------------|-------------|--------------|---------|
| | | Number. | Power used. | Number. | Power wasted. | Number. | Power used. | Kg. | Per ct. |
| | Lbs. | Per cent. | Per cent. | Per cent. | Per cent. | Per cent. | Per cent. | | |
| Two high train— | | | | | | | | | |
| I-beam | 1,760 | 91 | 30 | 9 | 30 | 9 | 70 | 1,452 | 82 |
| Three-high train— | | | | | | | | | |
| Channel iron..... | 1,496 | 79 | 40 | 21 | 40 | 21 | 60 | 1,033 | 76 |
| Three-high train— | | | | | | | | | |
| I-beam | 1,430 | 66 | 30 | 34 | 40 | 34 | 60 | 946 | 66 |
| Three-high train— | | | | | | | | | |
| Commercial iron..... | 2,640 | 20 | 70 | 80 | 70 | 80 | 30 | 1,958 | 74 |
| Reversing two-high— | | | | | | | | | |
| I-beam | 1,430 | 50 | 30 | 50 | 30 | 50 | 70 | 660 | 46 |
| Reversing two-high— | | | | | | | | | |
| axles | 1,430 | 72 | 30 | 28 | 30 | 28 | 70 | 858 | 60 |
| Reversing two-high— | | | | | | | | | |
| boiler plates | 1,870 | 63 | 30 | 37 | 30 | 37 | 70 | 1,001 | 54 |
| Reversing two-high— | | | | | | | | | |
| constructional plates..... | 1,870 | 70 | 30 | 30 | 30 | 30 | 70 | 1,100 | 59 |

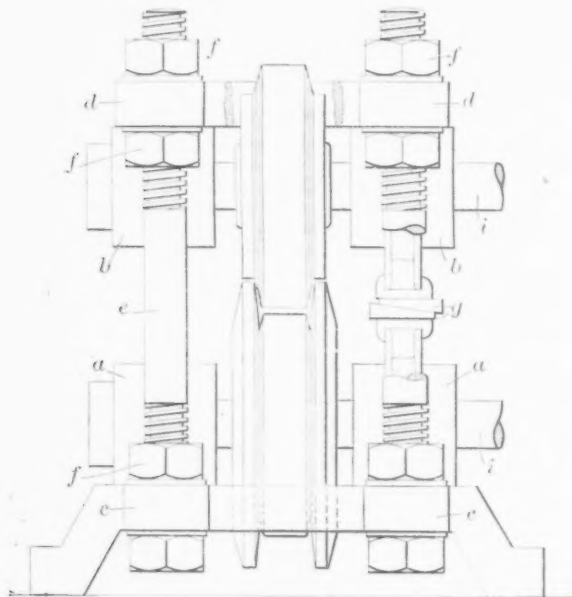


Fig. 1.—End View.

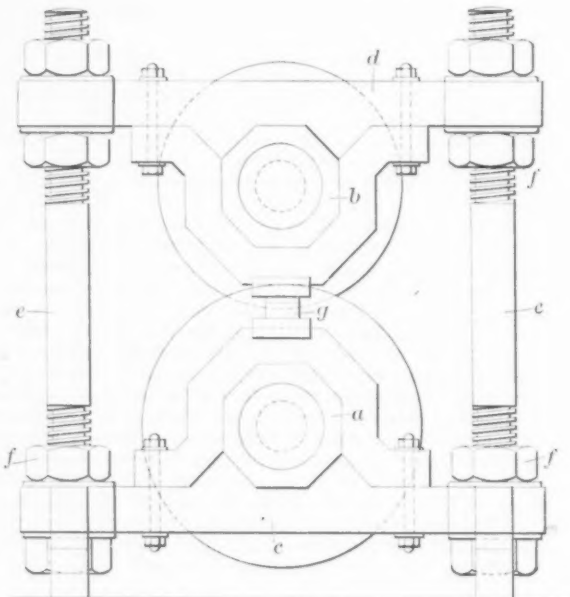


Fig. 2.—Side View.

Proposed Rolls.

SUGGESTIONS FOR THE IMPROVEMENT OF ROLLING MILLS.

economizing the steam consumption. With short pieces the ratio will be reduced in consequence of the numerous revolutions made before and after the piece has entered and passed the rolls. With larger slabs the same result will be obtained for a similar reason. As the engine works near to the limit of its maximum power, the man in charge has to start early to obtain sufficient momentum to carry the work through. The number of unloaded revolutions, therefore, is increased at the start, and they are made with great steam consumption. A little slackness on the part of the men in stopping these large engines at the proper moment is also provocative of waste.

The ratio of loaded runs producing boiler plates is 37 per cent.; constructional plates in longer lengths, 30 per cent.; plate billets of lighter size and section, 25 to 30 per cent.; girders of medium size up to 240 mm. height, 50 per cent.; axles for railway rolling stock up to 150 mm. in diameter and 1300 kg. in weight, 28 per cent.

These data have been gathered under the most favorable conditions for the trains to-day in use, in each case as regards steady work, careful and skillful work people, and experienced foremen, so that the calculations and statements given below may be regarded as well within the bounds of probability.

Fuel Wasted.

Given the consumption of fuel for producing steam for engines of different trains, the amount of wasted fuel can now approximately be calculated. The consumption of coal under the boilers per ton of finished material

The calculation of the last two columns was made as follows: The percentage number of runs, both unloaded and loaded, are multiplied by the power used in driving the unloaded mill, and the number of loaded runs is multiplied by the additional power used in driving when loaded. These products are then added together. For instance, in the first case:

$$30 \times 91 + 9 \times 30 + 9 \times 70 = 2730 + 270 + 630 = 3630.$$

Of these products, the first two, 2730 + 270, or 3000 out of the 3630, represent the waste, and from this the proportion of the 1760 kg. in the first column may readily be calculated as 1452 burnt to waste. The steam producing capacity of coal is taken as uniform in spite of the variable amount of steam consumption in the unit of time. The length of steam pipes, the large evaporating surfaces required in the boilers, the throttling of steam during the unloaded runs, &c., are among the defects that may be mentioned, but are to some extent counterbalanced by other circumstances. Under the most favorable conditions, therefore, the last two columns represent the minimum of waste, and the average will exceed it in most cases.

The number of times that the material has to be treated in separate mills must also be taken into consideration. In new iron and steel works intended for the production of large outputs of very varied sections, Bessemer or open hearth steel is cast in ingots weighing from 2 to 3 tons; the ingots after cogging are cut into billets for rails or beams of two or three lengths, or for boiler plates and structural iron of standard sizes, and

the rolling and finishing of the rails, beams or plates are carried out on second trains. In the manufacture of small sections or merchant iron the billets require to be drawn down to smaller dimensions and lighter weights for their further manipulation, and this is done on a second train, and then the iron or steel is rolled to the intended section in a third mill. In some cases, as with hoop iron or wire rod, a fourth mill may be required to finish the operation.

The distribution of grooves into detached trains and the number of passes required for producing certain sections may vary widely. The greater the difference between the sectional dimensions of the ingot or billet and of the finished material, the more grooves has the material to pass through; and accordingly, in consequence of the defects of the steam engine and rolling mills, the larger is the waste of motive power consumed by unloaded runs and revolving dead weights. Hence it will readily be granted that the quantity of fuel contained in the last two columns of the table above may be increased from 50 to 200 per cent., according to the size and shape of the output.

Besides these defects, which have been so fully dealt

iron passing the rolls, and the work must gradually be broken down into the shape required. To use the words of rolling mill managers, the rolled piece should fill the groove exactly, and no fins should be formed. There is a lack of precise laws; experience is the only guide at the present time. Even if those laws were known, the efficiency of the application of the motive power would still be a variable factor for each groove. The rolling surfaces of separate grooves are called into requisition in different degrees, in consequence of the increasing longitudinal dimensions of the rolled piece, so that they suffer more and more by wear and tear, and are sooner unfit for use. The worn out grooves have to be returned, and this necessitates turning the whole surface of the roll, even on the parts where very little or no repair may perhaps be required.

A disadvantage of the rolling mills at present used, and one that cannot be neglected, is the difficulty accompanying the accurate set of the grooves. This includes not only the congruence of the last or finishing groove with the intended section, but also the corresponding succession of grooves arranged in the same rolls, or in the rolls of another stand. Every one connected with

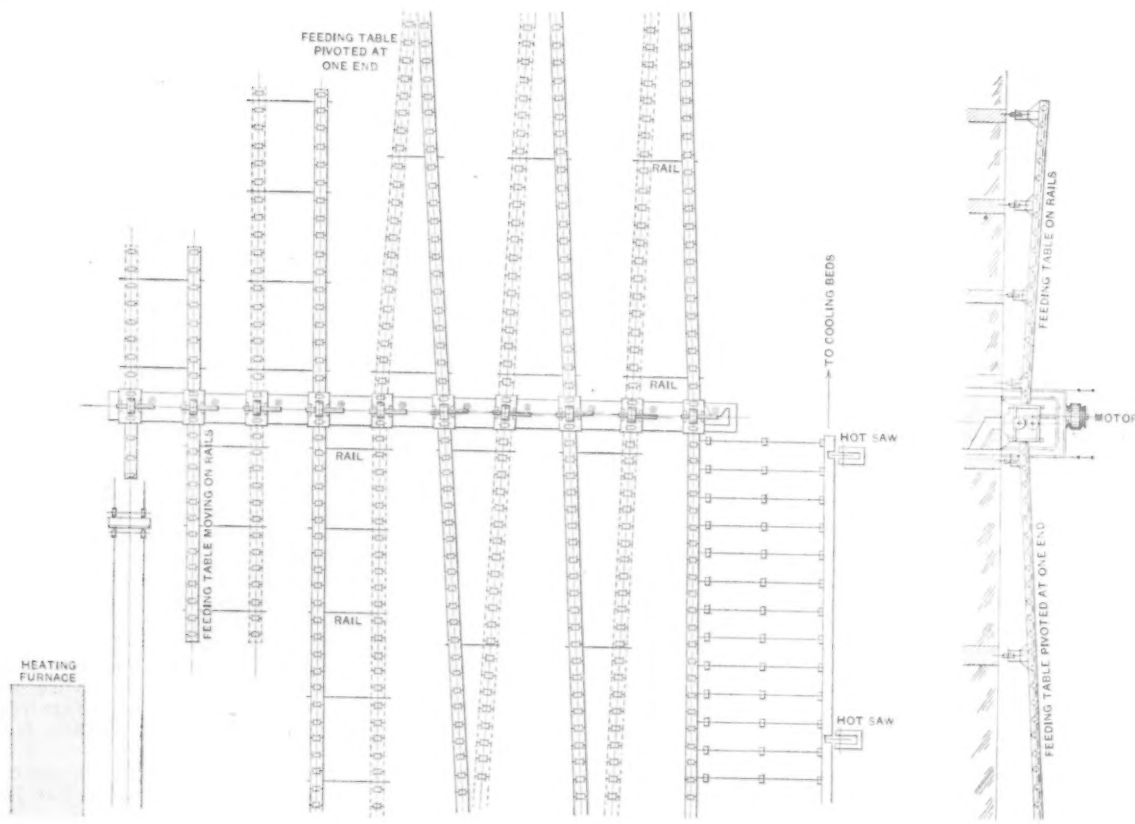


Fig. 3.—Plan of Proposed Mill Plant.

SUGGESTIONS FOR THE IMPROVEMENT OF ROLLING MILLS.

with, there are many smaller matters which enhance the price of the rolled material, and their co-operation is a factor by no means to be neglected. The simultaneous motion of many rolls has to take place in spite of the imperfect power transmitting and coupling arrangements and the unsuitable construction of bearings. Every shock and impact in the loose couplings causes great waste of power; they impair the steam engine and hasten the destruction of many parts. The defective bearings for the necks of rolls result in much waste of lubricant, and the wear and tear of the necks and bearings due to their unprotected situation is excessive.

Form of Grooves in Rolls.

The form of the grooves turned in the rolls is determined on principles found to be correct by experience. The sequence of the forms from the first to the last groove, and the dependence of each groove on the preceding one, is a function of the plasticity of the heated metal. The limits of ductility must not be surpassed, or longitudinal or transverse cracks will be formed in the

the management of rolling mills knows well that the setting of rolls with accuracy very often necessitates much expenditure of labor, material and time.

Improvements Suggested.

The conclusions deduced from these observations have led the author to seek for a solution of the problem under the given conditions—i. e., to construct a train in which the disadvantages enumerated above would be eliminated as completely as possible—and the problem does not appear to be difficult.

To avoid revolving dead weights, each groove is arranged in a separate pair of rolls. The dimensions of the rolls are settled by proportioning the material according to the power required. The elimination of unloaded revolutions is closely connected with the decrease of the weight, because fewer strokes of the engine are necessary to get up speed and the smaller masses come to rest more speedily after the work is done. With the same object in view, it is desirable to use those forms of motors and driving gears which require the shortest time possible

for developing the maximum power. Under ordinary conditions the electromotor is preferable; but there are cases, however, where hydraulic engines or belt transmission may be advisable.

These ideas may be carried into practice in the manner represented on the accompanying drawings, in which Fig. 1 is an end view and Fig. 2 a side view of a stand of rolls, each pair of rolls having a single pass only, while Fig. 3 is a suggested plan for a mill plant designed to roll girders $4\frac{3}{4}$ inches in depth, from roughed slabs 6 x 7 inches in section and weighing 815 pounds.

Each pair of rolls has a single pass only, and the rolls approximate to disks in form. They are made of steel to further reduce their weight, and their dimensions are proportioned to the work they have to do. The rolls are made with solid webs, or each roll may have a hollow or double web instead. In certain cases, as, for instance, in the preliminary reductions in a cogging mill, the rolls may be replaced by segments of a circle, to which a reciprocating motion will be given. The disks or segments are keyed on steel shafts *i*, running in bearings *a*, *b*, mounted on the bearers *c*, *d*. The bearings on the left hand side are closed by end caps, while the shafts pass through the right hand bearings to receive the worm, belt or other driving gear. The bearers *c*, *d*, at the top and the bottom respectively, are rigidly connected to form top and bottom frames, which are adjustably held at the proper distance apart by the 16 nuts *f*, on the four screws *e*. By manipulating the nuts *f* the height and vertical dimensions of the pass may be regulated. Double wedges *g*, or right and left hand screws, are inserted to assist in holding the bearings of the top and bottom rolls at the requisite distance apart. The bottom frame has four legs on which it stands. The rolls will be coupled direct to the engine or motor, which is fixed on the bed plate. The plan of the mill for light sections is shown in Fig. 3 and in section in Fig. 4. The rolls are placed side by side, with traveling or swinging roller tables to transfer the work.

In this plant the author believes it will not be necessary to change the roughing rolls on account of the varying sections required in the finished material, and that they will only have to be replaced on account of the wear in the bearings or in the grooves. Accordingly the details of the housings may vary somewhat from that shown. It is only in mills used for rolling medium sizes of merchant iron, for which the demand is very variable, that constant changes will be necessary. The other arrangements required at the present time for quick rolling will not vary greatly, and the auxiliary engines and other machinery will be retained in their present form.

Advantages Claimed.

It will be clearly seen from these statements that rolling mills erected on the plan here proposed ought to have many and great advantages over the present system, and that the improvements do not exclusively relate to the economy in the fuel used for producing motive power. Of the amount of that saving the table given above affords some indication, but definite knowledge can only be gathered from practical experience, and as yet a mill of this type has not been built.

The following advantages may be enumerated: The necks of rolls and the bearings will last longer, owing to the reduction of the ratio of unloaded runs and to the diminution of the pressure on the bearings. Their design may be improved to obviate the penetration of dust and dirt, the detrimental effect of which is so obvious, and they will not be exposed to the shocks and impacts caused by the loose couplings. A saving in lubricating material may also be effected, as a better type of lubricator may be fitted in place of the present rough and ready methods of oiling and water cooling. The omission of loose couplings, and the consequent reduction in breakages, need only be mentioned to be appreciated. Labor will be reduced and will be directed into its proper channel as a controlling factor instead of being used in the form of brute force. The mill train will be capable of a very large output on economical lines, but at the same time it will feel to a much smaller extent any fluctuation in the demand from the iron markets.

The amount of work done on the ingots during the rolling and the coal consumed under the boilers will vary in proportion to the quantity of rolled iron delivered. For example, the 12 pairs of rolls required for producing girders of medium size can all work simultaneously in case of need when the market wants large quantities; but if the consumption falls off the number of pairs of rolls working simultaneously will be reduced to suit the circumstances, and the coal consumption will be correspondingly lowered. On hoop iron or wire rod mills automatic starting and stopping gear for the engine, operated by the work as it enters and leaves the rolls, would almost eliminate the need for work people, who would then only be required to control the continuous co-operation between the heating furnaces and the mills.

The waste of material, time and labor which the ac-

curate setting of grooves entails will be nearly totally eliminated, and the changing and setting of a number of small rolls will be very much easier as compared with the huge masses that now have to be moved, while the saving in storage and in repairs will be very great. Duplicate sets of rolls and sets suitable for a very large number of sections could be kept, without waste of interest on idle capital. In conclusion, the author is strongly convinced that the results to be obtained in practice will far transcend those foreshadowed above, and that the installation of his system for rolling iron will effect great changes in the technology of iron as well as in its relation to common life.

Central Pennsylvania News.

HARRISBURG, October 15, 1900.—It is said that the demand for steel rails for foreign delivery has recently increased in a most gratifying degree. Several large orders have been placed, one for 4500 tons for a foreign railroad having been booked at Sparrow's Point. There is sufficient business ahead at the Maryland plant to keep the various departments in steady operation for three years.

The award of the contract for the erection of the approaches to the new East River Bridge to the Pennsylvania Steel Company was heard here with great satisfaction. It means work not only for the big plant of the company, but also for the Central Iron & Steel Company, who will make the plates. These two companies enjoy very friendly relations, and as their plants are within sight of each other the exchange of business is a beneficial arrangement for both. General Manager Campbell and J. V. W. Reynders, superintendent of the bridge and construction department, spent several days in New York consulting with the company's representatives there, not only about the contract which has been awarded, but also about others which will be made within a few months. There will be 1800 tons of steel in the approaches to the East River Bridge.

The anthracite coal strike has not seriously affected the Pennsylvania Steel Company's operations. Coke and bituminous coal have been substituted in some cases, but there is still a considerable supply of hard coal for imperative uses. Work is being pushed on the extensions to the plant, especially on the new frog, switch and signal department. All departments of the plant were in operation last week and the production was heavy. To-day the remodeled 50-ton furnaces of the open hearth department began operations. They have been supplied with automatic chargers. The five blast furnaces are making a large output. Roofers are now at work on the machine shop and new machinery is being placed in position.

Important extensions are about to be made to the new plant of the Harrisburg Foundry & Machine Company. Two new buildings will be erected. Work will be pushed as rapidly as possible, in view of the crowded condition of the plant and the increase of business from all parts of the country.

There are now over 2000 men employed at the plant of the Standard Steel Works, at Burnham, and it has just been decided by the officials to divert the course of Kishacoquillas Creek in order to make a further large extension of the plant. The officials of the company looked over the ground last week.

The question of wages in this district is pretty well settled, but it is a question, unless there is a stiffening of prices in some directions for the finished product, whether the present wages will not have to be reduced.

The South Harrisburg Chain Works have plenty of orders, and the force of employees has been increased during the last few days. The outlook is good.

At the plant of the Harrisburg Pipe & Pipe Bending Company the conditions could hardly be better. There is a big demand for pipe and the company are enjoying a prosperous season.

J. C. Gilchrist of Cleveland has closed contracts with the American Shipbuilding Company for two more steel steamers, making eight freight vessels that he has ordered within three weeks. The boats will be 10 feet longer and 2 feet wider than the six steamers previously ordered. They will be 376 feet over all, 356 feet keel, 50 feet beam and 28 feet deep. They will have the same power as the steamer "Clarence A. Black;" triple expansion engines, Scotch boilers, and will be fitted with the Hamden forced draft. The steamers will be built at Bay City, and according to contract will be completed June 1, 1901. They will carry about 5200 tons of ore at the present stage of water, and one will be operated by the Gilchrist Transportation Company and the other by the Lake Shore Transit Company. This makes a total of 22 vessels under contract by the American Shipbuilding Company, 15 of them for Cleveland parties.

A Monster Dredge.

Reference has been made to the launching on October 2, from the shipyard of the Maryland Steel Company, of the twin screw hydraulic dredge "Thomas." The "Thomas" and her sister ship, the "Mills," are being built for the Metropolitan Dredging Company of New York, for the work of dredging a deep channel 6 miles long x 40 x 2000 feet wide from the Narrows to the sea, across the Sandy Hook bar, for the purpose of allowing the largest ships to enter the port of New York at any stage of the tide. It is estimated that the work will mean about 40,000,000 cubic yards of excavation, and it is expected that it will take about four years to complete the contract.

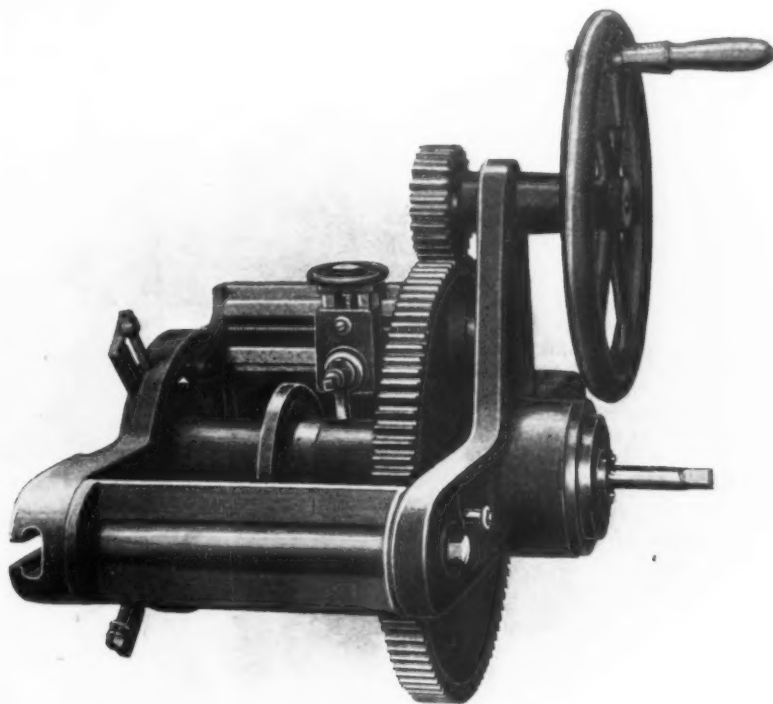
These vessels are the first of their kind built in this country, being similar in general principles to the "Branker" and the "Crow," operated by the Liverpool Dock Company. With the co-operation of the Maryland Steel Company, the plans have been prepared by Walter M. Bailey, engineer of the Metropolitan Dredging Company, who visited Liverpool to inspect the dredges there. He has been able to take advantage of their experience and improve his vessels in many respects. They will carry about 40 per cent. more material than the Liverpool vessels, load and unload in less time, and are also stronger and stiffer boats. The vessels are built through-

plex pump with water plunger 6 inches in diameter and 18 inches stroke, built for 1000 pounds pressure, which is used for operating the discharge valve cylinders and for raising the suction pipe.

The dredging operations are accomplished by lowering one end of the 48-inch suction tube from its well and starting the centrifugal pump. The hopper space is pumped full, and with the pumps still working, the water is allowed to overflow and the solid matter to settle. The boat is being moved ahead all the time about 25 feet or 30 feet per minute, with the end of the tube dragging and getting fresh material. When the boat is filled, she proceeds to sea under her own steam, and when nearing the dumping grounds, the large compound pumps are started, supplying water to the jets in the discharge valves, thus loosening the sand and freeing the valves, so that they can be operated more easily. The 12-inch cylinders raise the hopper valves three feet, thus discharging their load. The suction pipe is then lowered and the hoppers are flushed to wash them clean of sand before closing the valves.

The Stow New Crank Pin Turner.

The Stow Flexible Shaft Company of Philadelphia have designed the machine here illustrated for turning crank pins on locomotive driving wheels. It is bolted di-



NEW CRANK PIN TURNER.

out of mild steel. The dimensions are: Length, 300 feet; beam, 52 feet 6 inches, and molded depth of 25 feet, with a load displacement of about 7000 tons and a carrying capacity of 2800 cubic yards, which can be loaded in 45 minutes. The boilers and engines are aft. There are two inverted cylinders, direct acting, triple expansion engines, driving twin screws, with cylinders 18 inches, 28 inches and 45 inches diameter by 30-inch stroke. They are designed to give a speed of 10 knots. The boilers are 14 feet diameter by 11 feet 10 inches long, designed for 180 pounds pressure, and to be fitted with Ellis & Eaves' induced draft. There is also a donkey boiler 7 feet 6 inches diameter by 9 feet long. The vessels are fitted with electric lighting plant, evaporator and distiller.

The six hoppers on each side for disposing of the dredged material extend 125 feet amidships; eight 20 x 18 feet, and four 22½ x 18 feet, with a discharge capacity of the 2800 yards in about 5 minutes. The dredging machinery is forward. There is of this a 48-inch Morris centrifugal pump, with a capacity of 75,000 gallons per minute, and capable of overcoming a head of 40 feet. This is driven by two horizontal, tandem compound condensing engines, made by Clark Brothers, with cylinders 17 and 30 inches by 36 inches stroke. There is also a Stilwell & Bierce compound condensing pump, with steam cylinders 18 and 30 inches and water cylinder 24 inches in diameter by 24-inch stroke, and a hydraulic du-

rectly to the wheel. A set of four adjustable screws is provided at the back and it has the centering screws, with hardened point, on the front end. The carrier arm is planned to carry the tool post, which has an automatic feed screw, with forward and backward movement, covering the full length of the arm. The peculiar and main feature, however, is its rigidity, obtained by an arrangement at the inner end of the carrier arm, which carries a hardened roller revolving in a recess turned in the back end of the machine, and by this means the inner end is held perfectly rigid and therefore a straight cut is insured. This machine can be operated either by hand or power, the illustration herewith showing it with hand wheel attached.

The Johnson Iron Works, New Orleans, La., are now constructing four small steel stern wheel steamboats for the Mexican Government, which will be used in transporting supplies to troops in the interior of the country. They also expect to supply a number of steel barges built in sections, which can be riveted together when necessary.

The Intercolonial Copper Company, 714 and 715 Bannigan Building, Providence, R. I., are installing a 100 horse-power Corliss engine and a set of two boilers of 125 horse-power each at their mine, at Dorchester, N. B., as well as erecting a smelter to still further operations.

Experiments on the Reheating of Compressed Air.*

BY WILLIAM GEORGE WALKER

Patrick Y. Alexander of Experimental Works, Bath, and the author have during the past few months, at Chiswick and elsewhere, carried out some experiments on the reheating of compressed air. Considerable economy can be obtained by reheating compressed air before admitting it to the engine. Reheating is accomplished by two methods: 1. By passing the air through hot pipes heated by a furnace fire. 2. By passing the compressed air through water in a boiler at a temperature depending on the pressure in the boiler. The former is called the dry method, and the latter the wet or moist method of heating. It has long been the custom in Paris to use a small stove, through which the compressed air is passed before being used in the motor. Professor Unwin, F.R.S., states that "Professor Riedler tried an old 80 horse-power steam engine in Paris which had been adapted to act as an air motor, and which was actually giving 72 indicated horse-power with compressed air at $5\frac{1}{2}$ atmospheres. It was using about 31,000 cubic feet—reckoned at atmospheric pressure—or about 2376 pounds, of air per hour. This air was heated to a temperature of about 300 degrees F., by the expenditure of only 15 pounds of coke per hour. On a favorable assumption a steam engine working to the same power would have required ten times this consumption of fuel at least." Professor Unwin also says that reheating has the practical advantage of raising the temperature of exhaust of the motor, and for the amount of heat supplied the economy in the weight of air used is surprising. "The reason of this is that the heat supplied to the air is used nearly five times as efficiently as an equal amount of heat employed in generating steam." The author and Patrick Y. Alexander have, during the past few months, carried out a number of experiments on the reheating of compressed air by the wet method—i. e., by forcing compressed air into a boiler containing water—when very economical results were obtained.

Last year Professor J. T. Nicolson carried out some very valuable experiments in Canada under the auspices of the Taylor Hydraulic Air Compressing Company. Professor Nicolson experimented with five different methods of using compressed air in an ordinary steam engine of the Corliss type of about 27 indicated horse-power. 1. The air was supplied to the engine cold. 2. Steam was injected into the air in the main pipe before supplying it to the engine. 3. The air was injected among the water in the steam boiler and heated by mixing with the water and steam of the boiler before being supplied to the engine. 4. The air was blown upon the surface of the water in the steam boiler and heated by mixing with steam in the same, before being used to drive the engine. 5. The air was passed through a tubular heating vessel and heated by a coke fire, afterward being used to work the engine. The compressed air was drawn at a pressure of 53 pounds from the 6-inch main air pipe of the Taylor air compressor. The author gave an account of this compressor at the Bristol meeting of the British Association, 1898. The wet heating was carried out in a Lancashire boiler 7 feet diameter by 30 feet long.

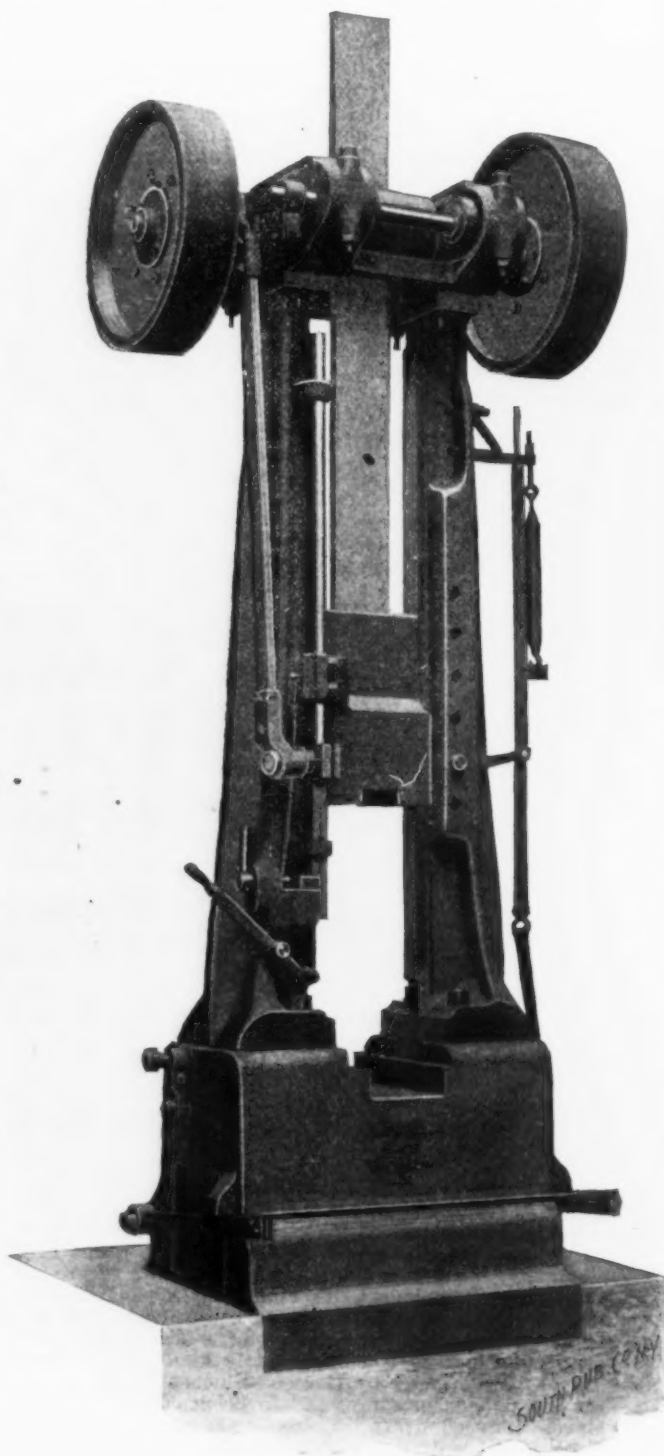
Experiments were first made without reheating, when about 850 cubic feet of free air were used per indicated horse-power per hour. The air was then heated to 287 degrees F., by passing the compressed air through pipes heated by coke, under which condition 640 cubic feet of free air was used per indicated horse-power per hour, being a reduction of 210 cubic feet of free air per indicated horse-power per hour, due to reheating. Thus a saving of 25 per cent. is effected in the quantity of air used. This saving was effected by the burning of 0.348 pound per horse-power hour. The results may be stated as follows: 100 horse-power in cold compressed air was raised to 133 horse-power when reheated to a temperature of 287 degrees F., by an expenditure of 47 pounds of coke per hour, or at the rate of 1.42 pounds of coke per horse-power per hour additional. This is equivalent to an additional horse-power for every pound of coal burnt in the heater, which is far more economical than the most efficient steam engine and boiler. By mixing from 10 to 15 pounds of steam per horse-power with the air, the quantity of air required was reduced from 850 cubic feet to 300 to 500 cubic feet per indicated horse-power per hour. The results showed that the extra horse-power due to heating by the wet method was obtained at an expenditure of 1.3 pounds of coal per additional indicated horse-power per hour.

The author's own investigations are most conclusive as to the efficiency of reheating either by the dry or wet method. Generally speaking, the results show that an

additional horse-power can be obtained with an expenditure of 1 pound of coal. Better results even than this have been obtained, which is far more economical than the most efficient engine and boiler using steam ever produced. And the experiments seem to show that in many cases it would prove advantageous to use compressed air in conjunction with steam in an ordinary engine.

The Merrill Drop Hammer.

The principal improvement in the new drop hammer built by Merrill Brothers of 465 Kent avenue, Brooklyn,



THE MERRILL DROP HAMMER.

N. Y., relates to the construction of the head or lifter. In this the brass eccentrics have been discarded, and a forged steel cam shaft substituted. This shaft has a fixed bearing at both ends in the head casting and is connected to a wooden rod by a lever forging. The friction roll shafts are babbitted in sliding boxes. The front boxes are connected by links to the cam shaft, which, when rotated through a small angle, moves the front roll in a horizontal direction to and from the lifting board attached to the ram. In use, the rear roll boxes remain stationary, but can be adjusted horizontally to compensate for wear

* British Association, Bradford, Section G.

of the board. By this arrangement of sliding boxes and horizontal motion the movable roll advances in line with the center of the opposite fixed roll, which insures the pressure of each roll against the lifting board being in the same place. Furthermore, in case the friction rolls should not be properly adjusted, it is impossible for the rod to fall far enough to allow the cam to pass beyond the center and thereby cause the rolls to bind and throw off the belts.

The frame of the lifter, being cast in one piece, ties the uprights together, and insures a true alignment of the bearings. The caps on either side can be taken off when it is necessary to remove the rolls or boxes, as indicated in Fig. 2. The rolls are opened by the hammer striking a dog clamped to the iron rod. The wooden rod, which transmits the motion to the eccentric lever, absorbs the

Chicago Drainage Canal Developments.

The City Council of Chicago have approved a contract between the city and the Trustees of the Chicago Sanitary district for the development of the water power of the great Chicago Drainage Canal. The price named in the contract is \$4 per horse-power per year, but an annual appraisalment by specially appointed representatives of the contracting parties is provided for. The contract is to run 75 years from July 1, 1901. The development of the power is dependent upon the city's right to issue bonds to the amount of \$2,500,000, the estimated cost of the improvement. As soon as the contract is signed, legal proceedings will be instituted to determine whether the city has exceeded its limit of indebtedness. If a de-

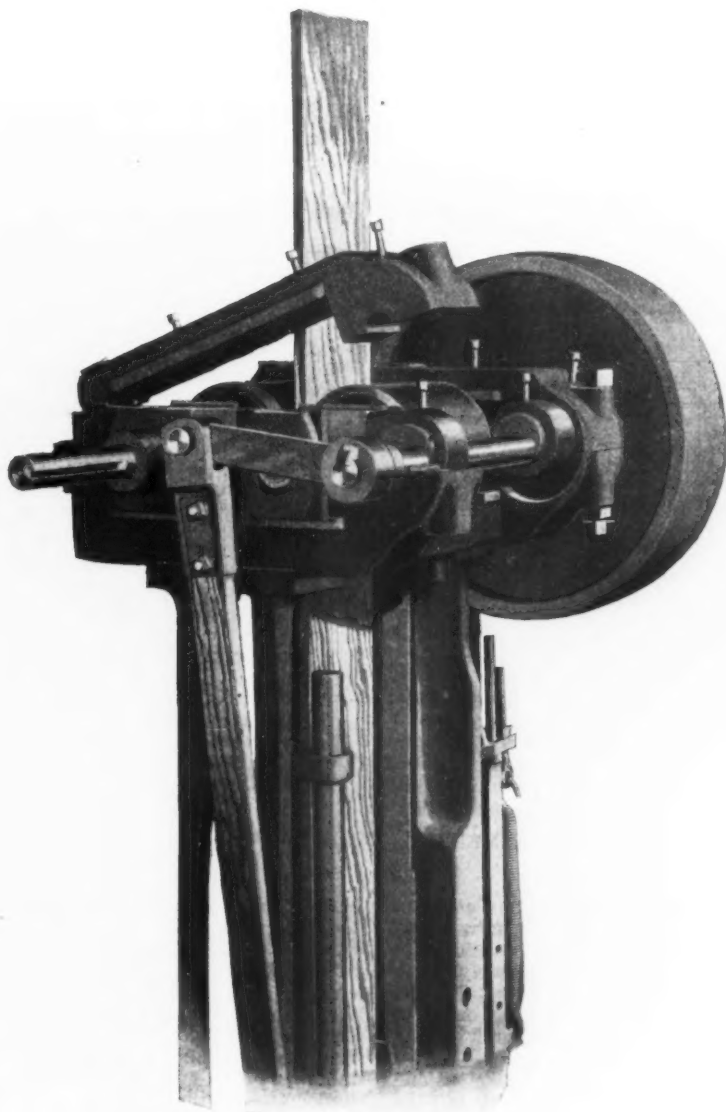


Fig. 2.—Lifter, Showing Cap Removed.

THE MERRILL DROP HAMMER.

shock before reaching the lifter. The hammer can be made to strike either a heavy or light blow at the will of the operator; or by the automatic attachment a succession of heavy blows can be obtained without raising the foot. The hammer can be lowered slowly when it is necessary to change dies.

It is reported that the Pittsburgh & Buffalo Coal Company of Pittsburgh have placed contracts for mine improvements, aggregating \$500,000, contingent on the re-election of President McKinley. Provisional contracts are said to have been placed as follows: Boilers and other machinery, the Erie City Iron Company, Erie, Pa.; structural steel work, Ft. Pitt Bridge Company, Pittsburgh; mining machinery, Jeffrey Mfg. Company, Columbus, Ohio; patented machinery, Goodman Mfg. Company, Chicago; general contracting work, Bollinger Brothers, Pittsburgh.

cision is unfavorable to the city the Sanitary Trustees will then have the power to sell the right to other persons. The contract can also be terminated at any time by either party upon one year's notice, but if the Sanitary Trustees take that action the city must be paid a fair cash value for the improvement. The contract binds the city of Chicago to use the power for municipal purposes only.

It is expected that this power, which is to be generated at Lockport, about 40 miles from Chicago, will amount to something over 20,000 horse-power. It is expected that this will give Chicago sufficient electric power, generated at Lockport and transmitted by wire to the city, to operate not only a sufficient electric light plant to light the streets of the entire city with electricity, but that it will also be ample to operate the several pumping stations which are now run by steam. The improvement is one of very great consequence to the people of Chicago and is in line with the recent growing

popular sentiment in favor of municipal control of public utilities.

Another interesting point has been brought out in connection with the Chicago Drainage Canal. Ordinarily the water in the Illinois River during the summer months is reduced to such a low stage that the stream is not navigable even for light draft barges. Owing to the large volume of water flowing into the river through the canal this year from Lake Michigan, the Illinois River has been maintaining an average of over 3 feet in excess of its depth in other summers. This has enabled a great deal of river traffic to be handled, particularly of grain. The farmers living contiguous to the river have been able to ship their grain to market at a lower freight rate per bushel than by rail, and grain elevators along the river that are usually idle for months at a time were steadily kept at work. The canal has thus proved of direct benefit to an important section of the State of Illinois although it is not yet in condition to take rank as a great factor in waterway communication, and will not be until the general Government improves the river channel to correspond with the depth of the canal.

The Yankee Drill Grinder.

The plant of the Fuller Mfg. Company of Kalamazoo, Mich., which was purchased by the Wilmarth-Morman Company of Grand Rapids, Mich., last spring, is being

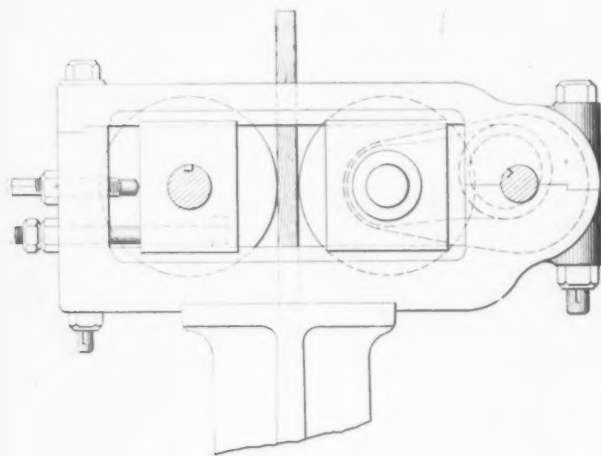


Fig. 5.—Side Elevation of Lifter.

THE MERRILL DROP HAMMER.

removed to the latter city. The machinery has all been removed from the Kalamazoo factory and is now being installed in the new factory on Canal street, Grand Rapids. The plant will begin operations immediately. The chief output of the Kalamazoo factory is the Yankee drill grinder. Later the company may venture out into other lines that can be followed in connection with the drill grinder business.

The new factory will occupy the second floor of one of the buildings of the Berkey & Gay plant on the west side of Canal street over the power canal. Part of the ground floor will be used for offices. L. T. Wilmarth, who was for a long time connected with the Clipper Bicycle Company, is president of the drill grinder company, and will take active charge as soon as the plant is installed. Cornelius Ridderhof, who was superintendent of the Kalamazoo factory, will continue in the same capacity. C. D. Fuller of Kalamazoo still retains his connection with the company, holding the office of treasurer. The company are composed of president, L. T. Wilmarth; vice-president, S. A. Morman; secretary, Charles E. Meach; treasurer, C. D. Fuller of Kalamazoo.

The drill grinders which the plant has been manufacturing are used by metal working factories and machine shops. The company make seven different styles of grinders and have lately invented another. They have a large foreign as well as domestic trade.

A New Crucible Steel Company.—The Old Diamond Steel Works of Reading, Pa., have been purchased by a party of Philadelphia gentlemen, and will hereafter be known as the Philadelphia Steel Company. The plant being particularly adapted for the manufacture of high grade crucible tool steels, this will be the principal business of the new company, although several kind of steels will be made. Walter Steel will be interested in

the company, and will be the superintendent. Mr. Steel learned the steel business with William Jessop & Sons of Sheffield, England. He came to this country to take charge of the Jersey City Steel Works, and after serving six years with this firm he was selected to take charge and erect the Carpenter Steel Works of Reading. Mr. Steel built the Diamond Steel Works, which the Philadelphia Steel Company have purchased. Aaron I. Sanson, Jr., is also largely interested in the new company, and will be the general manager and selling agent, his 25 years' experience among the steel buyers of this country giving him special facilities in that department. The directors are as follows: D. F. Vaughn, Thomas U. Parker, Aaron I. Sanson, Jr., James O. David and Daniel



Fig. 3.—Cam Shaft.



Fig. 4.—Sleeve Link.

F. Hallahan, the latter gentleman being the secretary. The main office of the company will be in the Stephen Girard Building, Philadelphia.

The Remington Automobile & Motor Company.

The Remington Automobile & Motor Company of Ilion, N. Y., announce that this company have purchased outright all of the right, title and interest of the Quick

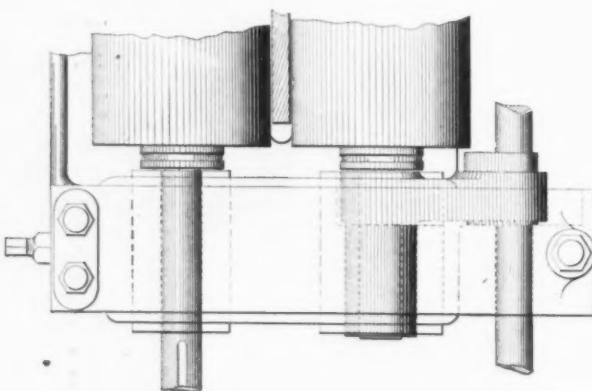


Fig. 6.—Part Plan View of Lifter.

Mfg. Company, makers of gasoline motors for vehicles, located at Newark, N. J., and have assumed their liabilities. It is their purpose to continue the plant at Newark in addition to the manufactory at Ilion for the present at least, or until orders in hand at the Newark factory can be completed, after which time the machinery, fixtures, finished and unfinished goods, &c., will be removed to their manufactory at Ilion. The Quick motor will be further improved, and will be marketed under the Remington name to the trade, and they are now prepared to receive orders for the same. As soon as the details of the transaction can be further consummated they expect to market the complete Remington standard automobiles. These motors for the trade will be built of 3, 4, 6 and 8 horse-power. They are of four-cycle internal combustion type, with two cylinders, and each is constructed as small as is consistent with good running qualities. The Remington Company will also manufacture for the trade carburetors and mufflers.

American Steel Hoop Company.—The report in one of the Pittsburgh daily papers that the Greenville mill, at Greenville, of the American Steel Hoop Company had been compelled to close down on account of lack of billets is untrue. We can state that all the mills of the American Steel Hoop Company are now in full operation. This concern are now ready to make prompt shipments of their full line of products, consisting of bar iron, bar steel, Bessemer and open hearth angles, channels, agricultural shapes, hoops and bands, both Bessemer and open hearth, and cotton ties.

The American Bridge Company, who have the contract for the iron work for the new Union Depot in Pittsburgh, have recently brought a large number of workmen to that city to prosecute the work.

The Taylor Spiral Riveted Pipe.

The American Spiral Pipe Works, 64 and 66 Wabash avenue, Chicago, have engaged in the manufacture of Taylor's spiral riveted pipe. Pipe of this character is not new, but its manufacture in the West is a new undertaking, and the enterprise is therefore worthy of notice. The manufacturers referred to have introduced an improved method of manufacture by which they are able to produce pipe of such quality and tightness that a cross section through a lap joint or rivet appears as a single piece. Fig. 1 is an illustration (exact size) of a cross section of a pipe, No. 16 gauge. It will be observed that the steel is partly depressed as it leaves the adjoining edges. The natural supposition would be that this was offset or formed before being riveted together. This, however, is not the case, the bend being formed by the tightness with which the overlapping edges are pressed together. The rivets are headed down, not by blows, but solely by pressure. The merits of spiral riveted pipe are apparent as compared with straight riveted. The spiral pipe is much stronger, and much less liable to injury in shipment and by rough usage. The difference is even greater in bursting pressure, as the seams actually strengthen instead of weaken the material. The company furnish this pipe in either



THE TAYLOR SPIRAL RIVETED PIPE.

black, asphalted, galvanized or double galvanized. The asphalted pipe is made in any lengths up to 25 feet, and the galvanized up to 20 feet.

Chester Notes.

CHESTER, PA., October 15, 1900.—This city scores another triumph in the completion of the big steam freighter "American," which has just made her trial trip before going into commission. She is destined for the trade with the Hawaiian Islands. She measures 430 feet over all, 415 feet on the load water line. Her beam is 50 feet central; depth, 34 feet 6 inches; load draft, 26 feet. Her coal carrying capacity is 1500 tons, and her freight load 8250 tons. A sister ship to the "American" is now on the ways at the shipyard ("The Hawaiian"), which will be launched the latter part of this month. Roach's shipyard sent out the big steamers of the Pacific Mail Line in the days of John Roach; it built the first iron sailing ship ever constructed in the United States, which carried its first cargo to a Pacific Coast port, and the same works now send forth the largest freighter that is to aid in developing trade in another field.

Kennedy & Logan, pattern makers, have just completed one of the largest patterns they ever turned out. It was a frame for a locomotive, 25 feet, and is constructed for eight driving wheels, the engine being of a very large type. The pattern was made for the American Steel Casting Company of this city.

A new modern factory building is being erected at Wayne, Delaware County, for the Philadelphia Hedge & Iron Fence Company. It will be fully equipped with the latest improved machinery for the manufacture of builders' iron work, iron gates, fences, &c. It is under the management of A. W. Findley.

In no branch of American manufacturing has more rapid advancement been made than in the production of all kinds of patterns and models for machinery, electrical apparatus and appliances, inventions, &c. One of the leading shops in Delaware County is that conducted under the name of "Penn Pattern Works," which were started November 1, 1898, by Samuel Cauffman. In June, 1899, Mr. Cauffman admitted as a partner John Baldt. In March, 1900, desiring to enlarge their facilities, they secured ground at Front and Penn streets, Chester. They produce models and patterns, making a special feature of inventors' models, placing their facilities at the disposal of mechanics and inventors who are desirous of securing working models.

A Recipe Wanted for Drying Coal Tar.—Manufacturers of castings and other iron and steel products use considerable coal tar as a cheap protective against rust. Some of them are in no special hurry to handle the coated articles afterward, but others cannot take the time to let them dry, and we are asked what can be

used as a rapid drier. We understand that benzine is used to some extent for this purpose, the quantity depending upon circumstances and to be determined by practical experience. If any of our readers have a recipe for a better drier than benzine, we would be pleased to receive it.

The Charter Gas Engine Pumper.

What has proved to be a popular form of gas engine attachment has been designed by the Charter Gas Engine Company, Sterling, Ill. The engine stands upon a base which also carries the countershafts, tight and loose pulleys and gears, also a walking beam and connections for readily and easily attaching to an ordinary wind mill pump standard. With the belt on the loose pulley the engine is easily started, as it does not have the weight of the pump rods and the water against it. The large gear is arranged so that the pump can make a 6, 8, 10 or 12 inch stroke, as desired. This outfit can be connected with any deep well pump very easily, or can be attached to a wind mill pump so as to be readily disconnected when the wind blows and the wind power be utilized. It will run a pump to raise 10 gallons of water per minute 200 feet, 20 gallons 100 feet, or 40 gallons 50 feet.

By this arrangement not only can the driving pulley be used for running other machines by throwing off the belt from the tight and loose pulleys, but there is room on the other end of the crank shaft of the engine for another pulley to be placed so that the pumping attachment can be operated and other work be done at the same time, if desired.

Underground Structural Steel Work.—The Wisconsin Bridge & Iron Works, North Milwaukee, Wis., have secured an interesting piece of work to be done for the Chapin iron mine at Iron Mountain, Mich. It is a contract for a steel chamber to be placed 1600 feet below the surface of the earth. It will take the place of the timbers which have for a long time served to support the roof of the space in which stands a very large pump, installed there for the purpose of raising water from the mine. The danger of fire has always been a menace from the use of so much wood, and if this should happen and cause the pump to be damaged or discontinue operations the result would be quite serious. The sides of the chamber will be perpendicular, and the top vaulted. Ordinary beams will form the frame work of the sides and curved beams the upper part. The sides will be covered with corrugated iron, which will take the place of lagging used in the timber work. The space between the iron walls and the rock will be filled in with concrete. The inside width of the chamber is 34 feet, its length 60 feet and its height from the floor line 15 feet 6 inches, with a space 5 feet 6 inches in depth below the floor.

A Change in Coke Rates.—The roads of the Central Freight and Trunk Line Association have arranged a revision and made a slight reduction in rates on coke from the Connellsville region, effective on October 15. There is no general reduction, but to a number of points which have mills and furnaces consuming coke the rates have been slightly reduced. Among the changes are the following: To Akron, Ohio, from Connellsville, the rate per ton is reduced from \$1.50 to \$1.40; to Barberton and Cuyahoga Falls, Ohio, the rates are reduced in the same way; to Edison, Ohio, the rate is reduced from \$2 to \$1.90 per ton; to Elwood, Ind., \$2.50 to \$2.25; to Grayville, Ill., \$3.15 to \$2.65; to Leavittsburg, Ohio, \$1.50 to \$1.40; to Massillon, Ohio, \$1.50 to \$1.30; to Metcalfe, Ill., \$2.65 to \$2.50; to Mt. Gilead, Ohio, \$2 to \$1.90; to Mt. Vernon, Ind., \$2.50 to \$2.25; to Oakland and Paris, Ill., \$2.65 to \$2.50; to Tallmadge, Ohio, \$1.50 to \$1.40.

Wyoming Iron Ore Going to Pueblo.—It is stated by a local journal that the Colorado Fuel & Iron Company are now taking large quantities of iron ore from the mines in the Hartville iron district, Wyoming. The daily shipments amount to 65 cars, or over 2000 tons. The principal mine, named the Sunrise, is operated with steam shovels and other modern machinery. The mine shows a working face of solid ore 100 feet high, and is so easily worked that the cost of mining and loading is estimated at less than 15 cents per ton. It is further stated that extensive preparations are being made to open up another iron deposit in the Sunrise Park. A tunnel will be run through the mountain on the south-east range of the park, which will be ½ mile long, passing through the Republic and Douglas mines, and coming out at the Good Fortune. This will add very largely to the producing area of the company.

Industrial Combinations.*

BY CHAS. R. FLINT.

A combination of labor is a trades union; a combination of intelligence a university; a combination of money a bank; an industrial combination is a combination of labor, intelligence and money, popularly mis-called a "trust." Combination is coincident with civilization. Savages have little power to combine, because combination depends on trust in our fellow man, and in primitive life it is fear that rules.

In the evolution of industrial life one of the first steps was to subdivide production into trades. Each did what he could do best, settling accounts by an exchange of products. Later, those engaged in the same trade formed partnerships, then corporations, and, finally, consolidations of corporations.

Against this march of industrial progress there has always been opposition. There have always been those who, appealing to special interests, to the unsuccessful, the discontented and the misinformed, have endeavored to obtain political favor by opposing progress, by endeavoring to prevent the natural, and mutually beneficial, co-operation between capital and labor. There was an anti-fast mail party in England in the time of Charles II, and the King and Council were petitioned to decree that "No public coach should be permitted to have more than four horses, to start oftener than once a week, or to go more than 30 miles a day." Macaulay's comments on this historical record read like prophecy. "We smile at these things," he said, and predicted: "It is not impossible that our descendants, when they read of the hostility offered by cupidity and prejudice to the improvements of the nineteenth century, may smile in their turn."

To-day there are men of intellectual refinement and pleasing personality far removed from the centers of finance, commerce and industrial activity, who read of industrial life, but who are not in it; who are studying the history of industrial progress, but are not making that history—and yet, as Bismarck said, "cursed with the dangerous gift of oratory," they are advocating theories in business and finance that, if adopted, would shake the very foundations of our industrial existence. They are half thinkers, because they think without the facts. They remind me of General Grant's most amusing after dinner speech to the newspaper men of New York. He said: "A feeling of awe comes over me when I realize that I am in the presence of men of such marvelous capacity. Your rapidity of conception, your unerring judgment, seem supernatural. When I was before Richmond, surrounded by men who had made a life study of military tactics, when, after days and nights of deliberation, a plan of campaign was finally determined upon, one of you would get down to your office late at night and in a few minutes dash off an editorial telling how we were all wrong, and pointing out what we ought to do. Your remarkable versatility was shown in formulating legislation, and you were peculiarly strong in international diplomacy where the existence of State secrets made it impossible for you to get at the facts."

In this great territory of ours we always have with us those who try to make people believe that their siding is the main track. We have had the "know nothing" craze, the "greenback" craze, the "granger" craze and the "silver" craze—but they were all rejected by the good sense of the American people. To-day our farmers recognize that the markets of the world have been opened to them through the great systems of railways, which have resulted in the heavy steel rail, the 80-ton locomotive and the continuous haul. Economically the wheat fields of Dakota lie nearer to London and Paris than the farms of Yorkshire and Burgundy. Thus favored, our farmers during the past four years have paid off so many mortgages that if ground into paper pulp they would make ballots enough to elect a President.

The men of sound judgment, leaders in the industrial wars for the supremacy of the American farmer, the American manufacturer and the American wage earner, should not be disturbed by the clamor of those who are not in the struggle, and therefore cannot appreciate the actual conditions, and whose leadership, if accepted, owing to their inexperience, would conduct us to inevitable disaster.

"The tendency of modern trade is toward consolidation, because the administration of the largest mass is the cheapest." Centralized manufacture permits the highest development of special machinery and processes. The factory running full time, on large volume, reduces the percentage of overhead charges. Direct sales on a large scale minimize the cost of distribution. Centralization of manufacture and distribution reduce aggregate

stocks, and therefore save in the shop wear, storage, insurance and interest. Consolidated management results in the raising and fixing of the standards of quality, the best standards being adopted; in avoiding waste and financial embarrassment through overproduction; in less loss by bad debts through comparisons of credit, and in securing the advantages of comparative accounting and comparative administration.

Industrial evolution, which is as inevitable and as unalterable as the law of gravitation, has attained its, as yet, highest development here in the United States. Every unprejudiced man must recognize its advantages, and that it is because of them that we are taking so important a position in the world's markets, increasing our national wealth, furthering the welfare and increasing the prosperity of our people.

The great problems of the economics of production have been solved; from this time forward all economic thought will be concentrated chiefly on the economics of distribution. And so the matter which to-day most interests us is not so much the fact of our great industrial prosperity, it is rather the question whether the advantages of that prosperity are equitably divided among the contributors to it:

1. Capital.
2. Superintendence, and,
3. Labor.

1. The share to capital takes the form either of interest or dividends. Now, we find that the rate of interest paid to those furnishing money to industrial enterprises is steadily decreasing. Fifty years ago the average rate throughout the United States was 8 per cent. per annum. Now it is less than 5 per cent. This general rule can be laid down: that the greater the confidence, the higher and more perfect the industrial organization, the lower the rate of interest. During the year 1896 the stability of our currency and the fundamental conditions of our industrial development were regarded by many with doubt; and money loaned as high as 25 per cent. The banker is ever willing to take lower interest in exchange for greater security and for a steadier and less precarious demand for his funds—and so that form of industrial organization which furthers careful financing, opens wider markets and guarantees greater confidence and stability is directly in the interest of capital, although the rate of return on capital is thereby steadily reduced.

The dividends received by shareholders are larger than the interest rates because the risk is greater, and, moreover, being partners and shareholders, they are entitled to a larger share in the advantages of combination. Still it is doubtful if the aggregate of dividends is anywhere near as large as the aggregate of interest. Moreover, dividends are never absolutely certain, and they are never paid until labor and superintendence have first had their share.

2. Now what is the position of the man of superior intelligence, for superintendence stands midway between capital and labor?

Highly developed organizations resulting in enormous volume of business have increased the necessity for intelligence, and as the supply of brains is not equal to the demand, therefore the price of brains is high. The turning over of individual business to combinations has caused the retirement of old men to the advisory board for judgment and has made way for young men for action. You ask, "What chances have our young men?" While you are asking the question, those of ability and energy have already started on a career of successful industry. If the student will leave his books and the orator the stump and go to our factories, to our great farms, to our mines, to our lines of railway, they will find ten times as many men receiving over \$3000 per annum as there were 30 years ago.

Mr. Schwab of Pittsburgh is a type. He started as a stake driver of the engineering corps; to-day, though under 40 years of age, he is president of the largest iron company in the world, and I can point out a hundred successful men to-day where you could not have named ten under old conditions.

But, it is said, they are dependent. Dependence upon each other is, however, the condition of civilization. The very word civilization implies community life, and community life means mutual dependence. Complete independence is found only in the wigwam of the Indian. There the young man builds his own house, makes his own clothes, gets his own meat, and keeps his bank account, if he has any, in his pocket. The best opportunity he has for distinction is in showing superior prowess in hunting, or superior strength in paddling his own canoe. In civilized life interdependence is more profitable than independence. Your young man, instead of paddling his own canoe, can command one of those great combinations which are doing so much to benefit the world—the steamship. The fact of the man on the bridge being dependent on the engineer, who is running the powerful machinery below, does not prejudice him any more than

* An address delivered before the Illinois Manufacturers' Association at their annual dinner on Chicago Day, October 9, 1900.

the engineer is prejudiced by taking his orders from the man on the bridge; each gives the other his opportunity.

Was Captain Clark less the commander or Chief Milligan less the engineer, because they were dependent on each other in making the historic run and the splendid sight of the "Oregon"?

You might just as well say that a man has no opportunity in political life because we have a police system and no man can do as he pleases. On the contrary, just as a good system of national police is a guarantee of liberty, so these great organizations are guarantors of opportunities which otherwise would never exist.

But let us not spend more time in considering who will take care of these young men of high aspirations and superior intelligence; they will take care of themselves. The Almighty has given the greater power to superior intelligence, and as Samuel J. Tilden, one of Nature's great monopolists in the domain of intellect, has said: "You cannot substitute the wisdom of the Senate and Assembly for the plan of moral government ordained by Providence."

3. Let us now consider the interests of the workingman in this economic evolution which has produced the perfect machinery and giant factories, supported by great aggregates of capital represented by shares which enable all to become investors. It is a fundamental fact that the man of superior ability cannot accumulate for himself without giving to the wage earners an opportunity to earn the larger share, and it is always an increasing share.

The tendency is to-day to a minimum of profits and to a maximum of wages.

When profits become abnormal, they invite competition, and are immediately reduced; in which case the consuming world is benefited solely. If they are not sufficiently abnormal to invite competition, then labor demands a larger share of the profit, in the form of increased wages, and it is either voluntarily or necessarily agreed to; in which case the body of wage earners reap the advantage. And, inasmuch as the body of wage earners is the great body of the community, it necessarily reaps the advantage in any case. Employees know almost as promptly as do the employers whether a mill is earning an extravagant profit. If it be they at once demand their share, and the employer must and inevitably does succumb. It is thus that wages always tend to a maximum and profits to a minimum.

The maintenance of the high standard of wages now paid in the United States is absolutely dependent upon our realizing the advantages which come through superior organization. We are to-day shipping manufactured goods to countries where the rates of wages average 40 per cent. less than our wage earners are receiving. Of our exports of manufactured goods 80 per cent. are produced by large industrial corporations. Articles of manufacture which we do not produce through consolidations are being almost entirely supplied to the neutral markets by the cheap labor countries—Germany, Belgium and England. The centralization of manufacture and consequent use of special machinery have emancipated the slave—have raised the American workman to the position of overseer, not of pauper labor, but of its productive equivalent, machinery. And he is receiving, and is entitled to, the wages of superintendence. Note the continuous substitution, through the use of larger capital, of mental labor and manual skill for pure brute force. Nothing illustrates this better than the evolution from the galley, where the sole power is muscle at the end of the oar, to the modern steamer. Notice also the moral difference. The man at the end of the oar was a slave. The modern engineer is a freeman of the highest type.

Now the intelligent labor leaders understand this perfectly. It was my pleasure to entertain at my home some of the best known of these. Speaking of labor conditions, I asked one of them to define the difference between his organization and that of the professional agitators. He replied: "We hope to bring about by evolution what they claim should be accomplished by revolution." They said that they welcomed new machinery, because it did the work which had heretofore degraded labor.

The wage earners of the United States are to-day enjoying a higher standard of living and a larger measure of well being than wage earners have ever before enjoyed in the history of the world. They are the real money power. The railroad managers have rails and rolling stock; the miner has mines; the manufacturer has bricks, mortar and machinery, and most of them have debts, and many are mortgaged to the banks for savings; but the wage earners in the United States have on deposit in cash in savings banks, subject to call, \$2,500,000,000.

Thus through co-operation and combination every interest is being benefited, but labor most of all. As wage earners become more intelligent, as they become over-

seers of machinery, they better understand these conditions. They have the intelligence to recognize that their greatest comfort and happiness is in furthering the industry of which they are a part. To-day one of the great advantages that the United States has over Europe is that its laborers are the more intelligent, are the healthier and happier. The European wage earner, instead of welcoming labor saving machinery as our workingmen in the United States have done, has tried persistently to retard its general use, and the result has been that while wages have been lower in Europe, the American workman has received more because he has produced more, and this is the great reason why, notwithstanding our high wages, we are so rapidly extending our trade with foreign markets. The best factory inevitably gets the most work. There is a continued struggle for existence between good factories and poor factories, and the good factory invariably wins.

The law of consolidation of capital and division of labor holds as good in the field of distribution as in that of production. It is inevitable and it is profitable. The department stores and the money order stores sell for 10 per cent. instead of 30 per cent. profit, and the consumer thus saves 20 per cent. The profit obtained by the distributor of staples, on the way from the farmer to the consumer, is less than one-quarter of what it was 30 years ago. The farmer secures a wider market, the consumer gets his staples just so much more cheaply, and the enterprising middleman avails of improved banking and transportation facilities to do a larger business. This is why he has adopted as his motto, "Quick sales and small profits."

The real benefits of "capitalistic production," as compared with production on a small scale, are twofold. The first and greatest benefit of industrial combinations goes to the whole body of the community as consumers, through reduction in prices. The next benefit, and that next most largely distributed, goes, as I have shown, to the workers through increase of wages, and thus it happens that the workingman gains simultaneously in two ways. He gets more money for his work and more goods for his money.

Having reviewed the position of our great consolidated corporations as the results of an economic evolution, I feel that something should be said with regard to their capitalization. In general there has been much greater conservatism in the capitalization of industrials than there was in the original capitalization of railroads. Our railroads were built principally for the amount of the bond issues, and the stock represented the capitalized hopes of the projectors. The issues of industrial bonds have been considerably below the actual value of the tangible assets, and industrial stock issues have generally been based on actual earning capacity. Still it is undoubted that there has been more than one instance of marked overcapitalization of industrials, and no proper legislative measure to remedy this wrong or prevent its recurrence should be neglected.

Fortunately, the evil caused by careless investing and unwise capitalization tends to correct itself by natural laws. Investors, naturally timid, confused by the few inflated industrials which were put out simultaneously with the sound ones, are afraid to buy, and the organizers, unable to sell their securities, now realize that sound capitalization is the best policy.

In organizing industrial companies, preferred stock, which is intended for an investment security, should not be issued in excess of tangible assets, except in special cases, where there is a very large earning capacity protected by valuable patents or trade-marks. Verified earnings and regular dividends will establish confidence, and the prices of the shares in the well organized and well managed industrials will advance as did the stocks of railroad companies which were originally issued for good will.

While I believe in great organizations; while I know that they are a necessity in order that this country should become a great power in the economic world and thereby continue the prosperity of the wage earners of the land, I do not believe in large aggregations of wealth in the hands of individuals unfitted to wisely administer such great trusts. One of the unfavorable features of our industrial situation is that the men of great constructive ability are passing away, and instead of there being a lack of opportunity, it will be difficult to find men to assume the arduous responsibilities of industrial leadership who have the knowledge, the judgment, the ability and the integrity of Carnegie and Huntington, of Rockefeller and Field, of Armour and Vanderbilt—the thinkers, the doers, the organizers—men whose creations are the great landmarks in our industrial history.

It is fortunate that we have had such leaders. They did their work with the aggressive force that comes of natural energy and temperate living, and with the judgment that comes of experience. They have understood and have been in sympathy with the people because they

have been of the people, and the example of those men, rising from the ranks, gives impulse, encouragement and high aspirations to every workingman in the land. They made their fortunes by reducing the percentage of profits and increasing the volume of business; by reducing the rate of freight on a barrel of flour to the Atlantic from \$3.50 to 65 cents; by reducing the price of steel from \$100 per ton to \$20; by improving the quality and reducing the price of provisions and by-products, while paying a higher price to the farmer for the animal; by reducing the price of oil from 30 cents to 10 cents; by reducing the price of cotton cloth from 20 cents to 3 cents. They realized that, in order to make their combinations a grand success, they must increase production by reducing prices to the consumer. Thus they not only helped to develop a great home trade, but enabled us to open the door of foreign markets, which has resulted in an enormous balance of trade in our favor, on which our prosperity so largely depends.

The industrials to-day are owned by the many. While economic evolution is centralizing production in large corporations, decentralization of ownership goes on simultaneously through the rapid distribution of shares. There are many hundred times more partners in manufacture, mining and railways than there were 30 years ago, and the number is rapidly increasing. Under the old conditions of private firms, the number of female investors averaged but 2 per cent. Now in every corporation they have many shares, and as shareholders they have the full right of suffrage.

Under the old conditions of private ownership the control of many of our industrial enterprises would have been inherited by one individual or family. Now the control is subject to the same rule that prevails in the administration of our State, and that is the rule of the majority. It is seldom (and fortunately so, as preventing great aggregations of wealth in the hands of individuals or families) that the heirs of giants in industry have the capacity to succeed to the direction of gigantic enterprises. Many inheritors of great fortunes, enervated by ease and luxury, prefer a life of indolence or to chase the will-o'-the-wisps of society; others prefer to devote their time to literature or art; others to enter upon scientific pursuits. Under the old conditions they would have inherited the control of industries, but under the present conditions of industrial consolidations the majority of the stockholders—for, generally speaking, the numerical majority is also the majority in interest—elect as officers aspiring young men who, through years of application to a particular industry, have proved their ability and judgment to assume the responsibilities of leadership. Thus the fittest survive.

In life nothing is stationary; contraction or expansion goes on continuously, and if you don't expand you contract. It is so with nations; Spain contracts; the United States expands. So it is with industry. There are periods of expansion when the mills are running full, and there are periods of contraction when the number of unemployed is large. Confidence is at the foundation of expanding business activity. The amount of business transacted on credit is over two thousand times that transacted in exchange for gold or silver. If there is confidence the manufacturer employs many hands, the laborers purchase more, the retailer sends more orders, the jobber orders more from the manufacturer, the manufacturer to still further increase his output employs more hands, and every man who wants work can find it. This is prosperity.

Lack of confidence causes contraction—the manufacturer is afraid to make many goods, discharges some of his laborers, they purchase less, the jobber cancels his orders, the manufacturer must still further reduce his payroll. The result is "hard times."

During the past few months of political agitation sufficient uncertainty has existed to reduce business activity, in spite of the country being in a most favorable condition for trade. Nothing better proves how sensitive confidence is than this holding up of business because of the remote possibility of legislation which may conflict with natural laws. In 1896 the fact that a national party advocated the undermining of our financial, legal and industrial systems created sufficient uneasiness to cause our bank clearings to decline 12 per cent. in comparison with the corresponding months of the previous year. It caused our interest rates to advance to 25 per cent. per annum, and threw out of work a whole army of men and women. You are all familiar with the change which took place in 1897 when conditions became assured—how renewed confidence set the wheels of prosperity in motion, a result which every one familiar with industrial conditions then predicted, just as we now know what will take place as soon as confidence is again restored.

If the mere possibility of unwise and immature financial and industrial legislation caused such a panic as that of 1896, what a terrible cataclysm would be occasioned if, instead of the possibility, we were confronted

with the actuality. The difference would be that between the storm and the cyclone. On the other hand, remove all questions as to the sanity and conservatism of our laws, as to the stability of our currency, as to the continuity of our industrial development in accordance with natural laws, and we will have a condition of prosperity such as no country in the world has ever known. When we entered upon a period of prosperity in 1897 it was after convalescing from a period of severe contraction.

Now we are producing gold at the rate of \$1,500,000 a week, and have a balance of trade in our favor of over \$10,000,000 a week.

Our exports of manufactured goods have been 40 per cent. more during the past two years than during the previous two years, and the balance of trade in manufactures has amounted to more during the past four years than during the previous existence of the Republic.

Owing to the mistrust in 1896 we were obliged to appeal to Europe for financial help. We were obliged to borrow money at high rates of interest. During the past four years, owing to our undisturbed industrial development, we have exported the products from farm and factory to such an extent that the balance of trade in our favor has amounted to \$2,000,000,000, which makes us a great factor in foreign commerce and a world power in finance. England, Russia, Germany and Sweden have come to us for money, and the credit of the United States Government is higher to-day than that of any other nation. When all doubt is forever removed as to the perpetuity of our gold standard, and no doubt possible as to the manner of selecting a Supreme Court, to which we must look for the enforcement of our national obligations as written in terms of gold, the American eagle will inevitably become the unit of international exchange in place of the English sovereign.

In view of the fact that the maintenance of high wages in the United States is largely dependent upon our increasing exports, the question is asked whether we could sustain them in competition with the cheap labor of China were China to become a manufacturing country. The best answer is that last year, among our other exports, we shipped 2,000,000 yards of cotton cloth to the Chinese. The average rate of wages paid by us in its manufacture was seven times the average rate of wages prevailing in China.

The Chinese, like the people in our own country who have a Chinese cast of mind, do not recognize the advantages of combination. Industrially they are living in the land of yesterday, instead of in America, the land of to-day and to-morrow. Notwithstanding her great agricultural and mineral wealth, notwithstanding the fact that she has the largest body of cheap labor in the world, China is not an efficient competing factor in the field of production, because, in spite of all these facilities, she has none of the antecedents, intellectual, political, financial or mechanical, for large scale production under modern conditions, since she possesses none of the instruments of commercial greatness and social well being. Twenty centuries of stationary policy and of looking backward have made political progress and economic development impossible for China. She has remained in industrial infancy. Lacking organization and all that goes with organization, production on a large scale, aided by large aggregations of capital and under conditions which attract and ennoble the greatest abilities, her agricultural and mineral wealth and her cheap labor cannot save her. She is left utterly behind in the economic race and her vast territories are now threatened with partition among the European powers.

Our contractionists would practically have us put a wall around the United States which would reduce wages and prevent the working out of our destiny as a world power in commerce, in finance, and in the greater and nobler field of doing our part in the advancement and civilization of mankind.

Situated as we are between the great oceans, combining the strength of a great land power with that of a great sea power, we are pushing our way across the Pacific as we have already done across the Atlantic. But this increase is small compared with the increase that is destined to take place when no question is being raised as to the stability of the foundations on which rests this great industrial prosperity.

With our untold natural resources, with our inexhaustible supply of metals and coal, with our great forests, with every variety of soil and climate, with the most industrious, most intelligent and most contented peoples working under the best conditions of modern methods, we are destined to become the economic masters of the world.

To Remove Iron from Brass Scrap.—Inquiries have been received from brass founders asking for a flux to use with brass scrap to remove the iron or steel scrap so often found with it. A flux of this character called

"Iron Flux" is manufactured by the Swarts Metal Refining Company, 20 North Desplaines street, Chicago. The manufacturers state that this flux causes the iron or steel to melt, when its lighter specific gravity takes it to the top of the crucible or pot, enabling it to be skimmed off. The same flux volatilizes sulphur or other objectionable accompaniments of brass scrap.

The Paris Exposition Medal.

We reproduce in the accompanying engravings the medal which is to be issued by the Universal Exposition of Paris, 1900. The awards in the order of their rank are the "Grand Prix," the Gold Medal, the Silver Medal, the Bronze Medal and the Honorable Mention. As we understand it, the exposition authorities do not furnish the medals actually, which the exhibitor must purchase. We are advised that Lathod Ainé, 50 Avenue Bosquet, Paris, has been granted the exclusive right to reproduce the official medal, and is now prepared to supply exhibitors at the rate of \$20 for extra heavy gilt, \$15 for heavy gilt, \$12 for heavy silver plated and \$10 for fine bronze.

The design, as shown in our engraving, is not strikingly beautiful, and in that respect will probably be considered disappointing.

Pittsburgh Valve, Foundry & Construction Company.

Some six months ago or more attempts were made in Pittsburgh to form a combination of the five leading



THE PARIS EXPOSITION MEDAL.

interests in that city engaged in making brass goods and pipe fittings. The negotiations were almost completed, when a hitch arose at the last moment. Within the last 30 days the matter has again been taken up, and this time will probably be put through, but on somewhat different lines from those at first proposed. Originally the capital stock was to be \$4,000,000, equally divided between preferred and common, but the promoters of the scheme found it impossible to float the securities on the market. The capital stock has been reduced to \$1,100,000, and will all be of one kind, and will be taken up by the five interests in payment for their plants. It is understood that none of the stock will be placed on the market, for a time at least. The five concerns to be taken over by the new interest to be known as the Pittsburgh Valve, Foundry & Construction Company are Atwood & McCaffrey, Pittsburgh Valve & Machine Company, Wilson-Snyder Mfg. Company, A. Speer & Sons, operating a large foundry in Pittsburgh, and the Shook-Anderson Mfg. Company. Originally the Best Mfg. Company of Pittsburgh was to be included, but this concern have pulled out and A. Speer & Sons, who make nearly all the castings for the other four interests, have been taken over. It is believed that economies in manufacture will be secured by consolidation of these interests, and while the business of the constituent companies heretofore has been confined largely to Western Pennsylvania, Eastern Ohio and West Virginia, more will be sought in the future in all parts of the United States. A preliminary organization has been effected, with Henry M. Atwood as president; Jos. T. Speer, vice-president; George E. Klingelhofer, secretary, and Charles A. Anderson, treasurer. A board of directors will be made up consisting of Henry M. Atwood, R. J. Wilson, Chas. A. Anderson, Jos. T. Speer, Geo. E. Klingelhofer. The main offices of the new concern will be in Pittsburgh, but the headquarters have not as yet been secured.

Canadian News.

TORONTO, October 15, 1900.—Trade is not perceptibly affected by the political campaign that is in progress here, and which will be kept up until November 7, the date of the Dominion general elections. There is a feeling that the tariff will not be greatly disturbed, whichever party gets in power. Though pledged to tariff reform the Liberals did not seriously reduce the protective duties after taking office, and they would probably not go much further toward free trade if they had another lease of power. The Conservatives, who are now in opposition, are avowed protectionists, but it is not believed that they would start in to raise the duties on any lines without due consideration of the effect. In fact, if that party had its way there would be some further reductions. The latest development of the Conservative policy, and the one kept most conspicuously in the front, is mutual preferential trade between Canada and Britain. The leaders of the party maintain that such British statesmen as Chamberlain, Salisbury, Devonshire and Ritchie have given the colonies ample encouragement to expect that a preference could be got in the British market for foodstuffs imported from the colonies. They believe that the Imperial Government can be influenced by the colonies to impose a small duty on the wheat, for example, of foreign nations, and to admit free the wheat of Canada, India, &c. In return for such a concession, which, it is claimed, would tremendously promote the settlement and production of Canada, concessions would be given in the Canadian market to goods of British production. At present British goods are ad-

mitted at two-thirds the rate of duty charged on non-British goods. From that advantage Britain is not deriving much benefit, as American exports to Canada still go on increasing at a far greater ratio than British goods to Canada. The Conservatives say that is because the existing tariff arrangements are unscientific. They hold that the general duties on certain staples—particularly in the iron and steel schedule—were cut so low that the preference to Britain availed her little. Sir Charles Tupper would see that the general duties on such staples are increased, and that on certain British goods a very marked preference is given, instead of a moderate preference on the whole list.

From the Conservative side, however, has come one utterance that takes the country by surprise. In a speech made in Brandon, Manitoba, Hugh John Macdonald, one of Sir Charles Tupper's lieutenants, and a son of the late Sir John Macdonald, declared that if this party were returned to office he would use his influence to have the duty taken off agricultural implements. Coming from a man who would certainly be in any Government formed by Sir Charles Tupper, this statement created something of a sensation. Of course, it pleased the West, where all are farmers. The McCormick and Deering companies have already cut into the trade of the Canadian implement manufacturers considerably, and if the 20 per cent. duty were taken off the American machines would either swarm in here or the price would drop \$20 per harvester.

Manufacturers and Railway Rates.

At a meeting of the Executive of the Canadian Manufacturers' Association, held in Toronto on the 9th inst., the report of the Railway and Transportation Committee was presented. Over 300 letters had been received by the committee complaining of the rates and classifications maintained by the railway companies on

sundry articles pertaining to the manufacturing industries. As a result of these communications the committee has forwarded representations to the railway companies calling for an adjustment of the rates on manufacturers' materials and products. A letter was also sent by the committee to the Minister of Railways and Canals, asking that proposed changes in classification and rates should be submitted, for an expression of opinion, to the shippers of the country before being approved by Order-in-Council. Iron founders figured largely in the complaints of excessive railway charges.

It has been decided by the railway companies to retain the commodity rates this winter, though some time ago their abolition had been determined upon. These rates are special, and are in favor of home manufacturers as against foreign manufacturers shipping into the country. During last winter the commodity rates were suspended, and manufacturers felt aggrieved. On iron and steel and certain other commodities the special rates are a material advantage to domestic industry.

The Quebec Bridge.

On the 3d inst. the anchor stone of the Quebec Bridge was placed by Sir Wilfrid Laurier in the presence of a great crowd of people.

The plans, prepared by E. A. Hoare, C. E., provide for an outlay of about \$4,000,000 in construction. The authorized capital of the Quebec Bridge Company is \$1,000,000, of which \$200,000 is subscribed and \$50,450 paid up. The Federal Government has given a grant of \$1,000,000, the Legislature of Quebec Province has voted \$250,000 and the City Council of Quebec has given \$200,000. For the remainder of the cost debentures are to be issued. The center span of the bridge will be the longest in existence, exceeding by 90 feet the cantilever span (1710 feet) of the bridge across the Forth. This center span will be 150 feet above high water. The steel superstructure, to be supplied by the Phoenix Bridge Company, will weigh 40,000 tons. The bridge will have double railway tracks, besides roadways for carriages, electric cars and pedestrians. The railway tracks will be used by the Grand Trunk, the Quebec Central, the Great Northern, the International, the Central Pacific Railroad and the Quebec & Lake St. John railways.

Kingston Locomotive Works.

For some months the locomotive works at Kingston have been continued by the liquidators, but now they are closed down, the latter officials having concluded not to continue operations after clearing up standing orders, and finding no important new business offering. It was hoped that the Government would turn some work into the industry, as it was wanting 20 engines for the Intercolonial Railway, the orders for which went to works in Manchester, N. H. Messrs. Reeves and Pike, the leading stockholders, have been anxious to sell the works to any parties offering a fair figure. An American syndicate made an offer for them, but made it a condition that there should be work ahead. Also the works are being negotiated for by W. King, who says that the people associated with him are persons interested in the International Power Company, the American Wheelock Company, at Worcester, Mass.; the Rhode Island Locomotive Works at Providence, and the Geo. H. Corliss steam engine plant. He has secured a 30-day option to buy the plant for \$75,000. He says the plant is antiquated, and not suitable for the class of engines nowadays turned out. He and his associates, he says, would spend \$150,000 on new machinery. He asks from the city free water, exemption from taxes and a loan of \$100,000 free of interest, the city receiving first mortgage bonds of the company.

Proposals to purchase the works have also been made by Gourlay & McGregor of Galt.

Sydney Iron Next Month.

A. J. Moxham, manager of the Dominion Iron & Steel Company, was recently interviewed in Montreal as to progress at the Sydney Iron & Steel Works. One of the four blast furnaces will be finished, he says, early in November, and it will be blown in immediately. The last furnace will be completed early next spring. At the beginning of next July the manufacture of steel will be started. Of the four blast furnaces the combined output will be from 1200 to 1400 tons per day. Practically the whole of the pig iron will be converted into steel. The second of the blast furnaces will be ready very soon after the first, the coke ovens have yet to receive about one-fourth of the work necessary for their complete construction, and the steel plant is well under way.

Minor Notes.

Recently the machinists employed at the works of Bertram & Sons, Dundas, organized a union. Then a deputation was sent to the firm to ask: 1, That the union be recognized; 2, that only the number of apprentices allowed by the union's scale be employed; 3, that the

minimum rate of wages be 16 cents an hour. These propositions were not all acceded to, and 60 of the men struck. Since that the firm offered an increase of 5 per cent. in the wages paid, but so far that has not been accepted.

The works of the Halpfnr Refining Company, Hamilton, have been leased to the Nickel-Copper Company there. The latter company will issue \$1,000,000 first mortgage bonds.

The Canada Foundry Company's plant in Toronto has been purchased by the Canadian General Electric Company.

The new building of the Ottawa Carbide Company is nearly completed. It is the largest structure on the Chaudière. It contains a very fine equipment. The machinery includes some very important improvements that have not yet been patented.

According to the *News* of St. John's, Quebec, a mine owner there has engaged to supply a large quantity of ore to the Canada Iron Furnace Company. This means the opening of the Memphremagog Mines near Knowlton's Landing.

P. D. Dods & Co. have withdrawn from the Dominion Paint Grinders' Association, and the price of lead has fallen 25 cents per 100 pounds in consequence.

Thomas Gibson has succeeded Archibald Blue as director of the Bureau of Mines in Ontario.

Coal is becoming very scarce both at Sydney and North Sydney, notwithstanding that the mines are worked to their utmost capacity.

The *Morning Post* of Sydney, Cape Breton, states, on what it declares to be good authority, that the Montreal Rolling Mills Company will establish their works at Sydney before the first of the new year. C. A. C. J.

The Proposed Stove Consolidation.

It is interesting to note what the newspapers are saying relative to the meeting announced to be held in Chicago on the 16th inst. for the purpose of endeavoring to form a consolidation of stove manufacturing properties. The mere announcement of the meeting is taken by many editorial writers to mean that a "stove trust" is sure to be organized, which will embrace all the stove manufacturers in the country, and great indignation is expressed thereat. The strike of the anthracite coal miners and the formation of a "stove trust" are regarded as twin calamities that are descending on the defenseless heads of the poor householders. While it is of course possible that a consolidation of stove manufacturers can be accomplished, we are not alone in our belief that it is improbable. Numerous stove manufacturers scoff at the proposition, and deny that they have either given options on their properties or have seriously considered the advisability of doing it. Denials of any connection with the project are even being made by officers of companies named in the original press dispatch from Pittsburgh as backers of the scheme. The stove manufacturers who oppose a consolidation cannot prevent promoters from working with such an object in view, and it is probably true that quite a number of options on properties have been secured, but a great deal more must be done to accomplish such a scheme and apparent impossibilities must be surmounted. Meanwhile, those who are lashing themselves into a state of fury over an "iniquitous stove trust" would do well not to waste their energy in that direction. It can be more profitably used for some other purpose.

The Continuous Wage Scale.—Preliminary steps are now being taken by officials of the Amalgamated Association, at Pittsburgh, looking to the compilation of a perpetual wage scale. It is not likely anything will be done in this matter until after the first of the year, but the Amalgamated Association have it in charge, and it is understood are favorable to the scheme. It is thought that by having a wage scale continuous in operation the expensive conferences held every year between wage committees of the Amalgamated Association and the manufacturers would be done away with, and a good deal of money saved on both sides. More important than this is the fact that with a continuous wage scale the costly shut downs in the middle of the summer would be reduced to a minimum. The manufacturers are favorable to the proposed continuous wage scale, and, in fact, suggested it at the Cincinnati conferences. It is probable that definite action will be taken in the matter shortly after the first of the new year.

The Sharon Steel Company, at Sharon, Pa., will put a force of 400 men at work in a few days building a new railroad from their works in South Sharon to Leesburg, Mercer County, Pa., where their coal mines are located. The road will be about 20 miles long.

Aluminum:

Considered Practically in Relation to Its General Application in the Arts and Mechanics.*

BY JOSEPH A. STEINMETZ

"As light as air! As bright as silver! Impossible of tarnish! As strong as steel! Cheap as clay!"

"The great new white metal aluminum. Houses, bridges and locomotives to be built of it. Iron and steel, metals of the past; with the great 'Aluminum Age' drawing upon us." Such picturesque and startling remarks were not at all uncommon ten years ago, and even more recently in the most prominent local papers and technical journals. To the unthinking mind, it was perhaps quite believable that aluminum, the laboratory curiosity costing dollars per ounce, should excite wild dreams of coming wonders when, almost over night, the discovery and successful application of the electrolytic methods of reduction put the price of this unknown metal to almost as many cents per pound.

But nothing could have contributed more to its disadvantage and disaster of its industrial development. Years of time and tons of samples have not yet served to disillusionize the world of these disastrous notions, and hundreds of thousands of dollars have been ruthlessly wasted in trying to force the metal to perform impossible services, devoid of wisdom or foresight.

The purpose of this paper is to briefly enumerate those uses of aluminum that have proved satisfactory and extensive, with the view of encouraging further applications along kindred lines, and to speak a word of caution regarding improper uses of the metal, so that disaster may be avoided, and to save aluminum from further damage to its chemical and physical reputation. From the fact that the aluminum output is almost doubling from year to year, it is almost as impossible to cover the uses of the metal in detail as it would to trace the myriad uses or applications of any particular metal, such as silver, copper, brass, zinc, tin plate or galvanized iron.

A satisfactory classification is nearly impossible, hence the thousand and one uses of the metal will be jotted down in a running list as the suggestions come to mind.

Upon the use of aluminum in the metallurgy of steel we will not dwell, save to briefly remark that for this purpose many hundreds of tons of metal are annually consumed. The aluminum is added to molten steel in proportions of a few ounces to the ton of steel, in the making of ingots and billets. Larger tonnages are treated in the process of making steel castings by adding the aluminum to the molten mass before pouring. It has also been found of great advantage, to insure the making of a perfect casting, to insert small scraps of aluminum in the mold at such places and corners and cores where difficulties threaten.

Many tons of aluminum are yearly used for the making of patterns. It is indeed a most correct use to replace the old heavy brass gates of patterns with the light weight aluminum, stiffened with about 5 per cent. of zinc and a like amount of copper. The advantages of these light weight patterns are manifest. The men at the benches can mold more forms in a given time and with less fatigue. The patterns, weighing but one-third as much as brass, can be handled and stored more readily and cheaply. The express charges upon return of patterns are greatly reduced—an item of considerable magnitude in an active foundry.

Immediately the very large use of aluminum suggests itself for models and salesmen's samples. Particularly will the hardware traveler see the boon of this, and many of our largest houses have full lines of salesmen's samples, replacing the old line of iron work or nickel plated brass, at a reduction of 60 per cent. of weight and of no increase of cost.

Not long ago a large foundry of Wilmington, and later a Philadelphia foundry, had some large iron castings to make, the yokes of cable roads, great iron pieces spreading the full width of the track and supporting the rails, and carrying in their middle the conduit through which the cable ran. These castings were made from wooden patterns, which caused much trouble by chafing and wearing in the sand, and warping and springing out of alignment. At the suggestion of the writer these patterns were duplicated in aluminum, and all difficulties were thus transformed into unpleasant memories, and the work fell out good and sound and true.

Until recently aluminum has not been employed as an active competitor of brass and copper on account of its higher comparative price, but to-day aluminum is

cheaper than copper, considered bulk for bulk. Copper is three and one-third times heavier than aluminum. Taking, therefore, copper at its present market price, and increasing by this factor, it will appear that aluminum is cheaper, a fact which should open many channels of new application for aluminum.

Aluminum Solder.

One thing that has figured seriously to the disadvantage of aluminum, and, indeed, has quite precluded it from many excellent fields of use, is the lack of a good, cheap, easily worked and permanent solder. It is true that there is a most excellent solder upon the market, invented by Joseph Richards, but this solder is difficult to apply and it is frequently beyond the ability of the ordinary tinsmith to secure a satisfactory joint. There are several reasons for this lack of success. Not keeping the work hot is the chief cause of the solder mushing and making a rough, dirty seam. It is very often true that the peculiar pattern or intricate design of the piece makes it impossible to keep the work hot at the points to be soldered. Then, too, the quick formation of a film of oxide upon the aluminum, unless removed by scratching or filing, figures to the disadvantage of a solder by not permitting it to take a firm hold upon the parts to be joined. Wherever possible, then, it is earnestly suggested to make joints by crimping or lock seaming or by riveting, or, better yet, to avoid all joints by spinning or drawing up the shape to be made, whenever its contour will permit of such practice. The old saying that "the best joint is no joint at all" holds good here conspicuously.

The Growth of Production.

A few remarks relative to the growth of the aluminum industry, with comparative figures, will prove of interest. The following table shows the aluminum production of the United States and of the world, expressed in metric tons (2000 pounds):

| | United States. | World. | Per cent. in United States. |
|-----------|----------------|----------------|-----------------------------|
| 1889..... | 21.6 | 70.9 | 30 |
| 1890..... | 27.9 | 165.3 | 17 |
| 1891..... | 68.2 | 233.4 | 29 |
| 1892..... | 118.1 | 487.2 | 24 |
| 1893..... | 154.4 | 716.0 | 22 |
| 1894..... | 250.0 | 1,240.9 | 21 |
| 1895..... | 417.3 | 1,418.2 | 29 |
| 1896..... | 590.9 | 1,659.7 | 36 |
| 1897..... | 1,814.4 | 3,394.4 | 53 |
| 1898..... | 2,358.7 | 4,500.0 (est.) | 52 |
| 1899..... | 2,948.4 | 6,000.0 (est.) | 49 |
| 1900..... | 4,000.0 (est.) | 7,500.0 (est.) | 53 |

Those returns marked estimated (est.) are the best which can be conjectured from available data. The aluminum industry is growing most rapidly in France and in the United States. Canada will enter the list of producing countries next year, with a plant of 5000 horse-power, and will add 1000 tons each year to the world's output.

Presuming that the total amount of aluminum produced last year was used for the specific purpose of electric conductors, then the 6000 tons of aluminum would displace 12,000 tons of copper, or a like amount of aluminum sheet would be equivalent to 20,000 tons of sheet copper, were the specification for culinary and cooking utensils.

These comparative figures emphasize the important position that the metal has assumed.

Considering the United States alone, of the metals produced here in 1898, only pig iron, copper, lead and zinc were produced in greater quantity than aluminum, and only these, with the addition of gold and silver, surpassed it in the value of the output.

If we desire to manufacture a given object of metal, we can make it cheaper in aluminum than in anything else, excepting iron, lead or zinc, to which might be added, among composite metals, tinned and galvanized iron.

These are the only metals left for aluminum to compete with, and its greatest struggle in the future will be against tinned and galvanized iron. Dr. Richards believes that when the market price of aluminum reaches 15 cents per pound (probably in the next decade), it will compete actively with these common metals, and by 1925, when it will probably reach 10 cents per pound, its only practical rival will be steel.

The middle of the twentieth century will see steel and aluminum standing side by side as the most useful of the useful metals, aluminum having by that time developed many peculiar alloys enhancing its physical properties and largely increasing its field of application.

The plants now producing aluminum are those of the Pittsburgh Reduction Company, at New Kensington, Pa., and Niagara Falls, N. Y.; the British Aluminum Company of England; the Aluminum Industrie Aktien Gesellschaft, at Neuhausen, at the Falls of the Rhine, in Switzerland; the Société Electrometallurgique Française, at La Praz; the Société Industrielle de l'Aluminium, at

* A paper read before the Franklin Institute of Philadelphia.

St. Michel, in France. There are also several large plants projected and in course of construction, notably upon the St. Lawrence River, in Canada, and at the Rheinfelden and Salzburg, in Germany.

The Hall patents under which the Pittsburgh Companies are producing expire in 1906, and by that time other competitors will be actively engaged in adding to the domestic tonnage. Then, too, it is more than likely that attempts to repeal the import duty of 8 cents per pound will soon be made, as this duty is no longer necessary for the protection of our infant industry, particularly in view of the fact that a large percentage of the aluminum produced in this country is exported to Europe, leaving the supply of metal at home quite inadequate for domestic needs.

Aluminum for Bathtubs.

Some years ago, when aluminum was thrice its present cost, the proprietor of a certain brass foundry in Philadelphia had the courage to back up his convictions that the metal was ideally suited for bathtub work. Some years even before this, a maker of bathtubs had attempted its use in sheets for this purpose, by lining the old wood box with aluminum sheets joined by crimping and soldering. They had to abandon the project after repeated failures to secure a tight seam and joint, lacking a solder that was easy to work, and that would readily run out a long seam. These same lines were unsuccessfully attempted by other bathtub makers, who had met with some encouragement by avoiding the soldered seam by flanging the sheets and clamping the edges thus formed between an iron frame, which acted as the support to the basin body. The brass foundry previously mentioned followed radically different lines and made a single sand casting of the complete tub with its roll rim, the same pattern as we now see in enameled iron, upon which it is almost impossible to improve, unless perhaps by a stamped sheet steel tub or one of molded glass. This cast tub weighed 150 pounds, and the rough sand casting was ground smooth upon the inside and around the rim by use of an emery wheel upon a flexible shaft, after which the tub was polished bright upon a rag buffing wheel. A perfect casting was difficult to obtain, due to blow holes and shrinkage cracks and sinks, and the difficulty of this piece done in practically pure aluminum can well be appreciated by those familiar with foundry practice. The effect thus obtained was decidedly brilliant and most pleasing, but the tub failed ignominiously in the test of time and use. The alkali of the soaps utterly destroyed the luster of the finish and ate deeply into the body of the metal, marring and pitting it beyond measure. Thus it came about that another use for aluminum became impossible of realization. The same general observations apply to the large list of plumbing fixtures of aluminum evolved at about this time, such as faucets, chains, handles, soap dishes, basins and many standard shapes in nickel plated brass, which were quickly retired, as brief experience proved their worthlessness.

Kettles and Caldrons.

A most excellent use for aluminum is found in the making of steam jacketed kettles and caldrons for boiling of syrups, fruit juices, honey and wax, as well also as for certain acid work, for which the peculiar chemical properties of the metal specially adapt it. An example of this might be cited in Mr. Levy's nitric acid atomizer for zinc etching, a great improvement over the old acid bath for obtaining quick action in making etched plates for printing. There has recently been completed by a coppersmith of Newark one of the largest aluminum kettles ever constructed; the hemispherical bottom or bowl, measuring 51 inches across its diameter with its flanged edge, and 30 inches deep, was cold hammered and formed up out of a flat circle 68 inches in diameter, and the upper band or tubular body was curved around out of a flat sheet measuring 13 feet 8 inches long by 14 inches wide. The kettle was hammered out of $\frac{1}{4}$ -inch stock, and the bowl was much more readily shaped and more responsive to the tools than even copper. The purpose of these large boiling kettles is for melting wax for the cylinders of the Edison Company's phonographs, as the wax cylinder material seemed to attack iron and copper kettles, whereas the aluminum boilers are entirely unaffected.

Electrical Wires.

In the electrical field aluminum is forging ahead rapidly into significant prominence. It was singularly opportune for its introduction for electrical purposes that the price of copper advanced just at that time when the processes of making aluminum in increased quantities and at reduced figures of cost had been satisfactorily installed, and when new uses and new fields were being eagerly sought; for immediately many careful experiments were undertaken to determine the possibility of

substituting aluminum for copper, and these investigations promise to produce most encouraging results. Comparative tests are now being made by the Chicago Fire Alarm Service between copper wire and aluminum. No. 10 wire was used and the preliminary tests before erection showed that the tensile strength of the copper wire was greater, size for size, but not so great, weight for weight. The copper wire showed a greater elongation and endured without rupture a greater number of twists—in fact, twice as many as aluminum. To secure further data under the actual service conditions, the Chicago line will be given a winter's test and has been strung in the stormiest section of the city, and where it will also be subject to the smoke and gaseous fumes arising from the locomotives passing in that section. The results of this service test will be made the subject of a report this spring by City Electrician E. B. Ellicott of Chicago to his board. The Western Union Company have several miles of aluminum wire in use now for over two years, and are carefully compiling the physical data necessary for a consideration as to its merits in comparison with copper and iron.

A very interesting report relating to the "Tests and Calculations for a 40-mile Aluminum Wire Transmission Line," by E. A. Perrine, as erected and conducted by the Standard Electric Company of California, is printed at length in the *Aluminum World* of November, 1899. General Greeley, chief of the Signal Branch of the United States Army, had several outfits of aluminum portable field lines in use in Cuba during the recent war, and he reports that they were very satisfactory and particularly advantageous, owing to the light weight of the coils of aluminum wire. The main electric conductors in use at the reduction works at Niagara Falls are made of large aluminum bars many square inches in area, and have been giving satisfactory service for years. To some extent aluminum has been used for commutator segments, but the difficulty in wiring up due to the different metals in contact caused serious discouragements. Blades for switchboards have been successfully manufactured.

Cooking Utensils.

The advantages of aluminum for use in the making of culinary and cooking utensils were early recognized, and the new metal bids fair to excel copper in this line of development; in fact, many hundred tons annually are now consumed in the successful manufacture of such articles. The early exploitation of this field was most discouraging, owing to the fact that the manufacturers of cooking utensils understood the peculiarities of the metal no better than the consumers who purchased the articles for use, and the utensils were generally seriously abused, battered and neglected, the universal idea being that aluminum was quite indestructible, no matter how abominably treated. The utensils were allowed to take care of themselves; they were ground and scratched with sand soap and often washed in lye, which, being one of the solvents of the metal, caused rapid disintegration. These early attempts to introduce aluminum cooking utensils were made at a time several years ago when copper was less expensive, and when enameled iron and tinned and steel articles were infinitely cheaper. These adverse circumstances tended seriously to the retirement of aluminum from this field, but later developments, such as the fall in price of aluminum and the heroic efforts of our pioneer manufacturers, quickly regained the ground thus lost and forged rapidly ahead to well merited success, for now aluminum cooking utensils, household articles and culinary shapes for the home, institutions and hospitals, field equipments for the army and outfits for the navy, and the innumerable uses heretofore supplied by copper, tin sheets and enameled iron are divided with aluminum, and the new metal bids fair to win first honors.

Among some of the advantages possessed by aluminum over the other metals might be cited its higher heat conductivity; its light weight, bulk for bulk; the fact that it creates no poisonous salts or oxides when used in the preparation of fruits and vegetables and other possible combinations dangerous with copper or tin. A very large use of aluminum in forms of caps and covers, stamped out of sheet metal, for sealing catsup, mustard, fruit, jams and jellies, and various lines of such goods, has been lately developed, the advantage of price and absence of dangerous corrosion or acid action making aluminum an ideal metal for these purposes.

In Europe the peculiar advantages of aluminum have been recognized for a much longer time than in America, and a number of the largest manufacturers in England and on the Continent are making complete lines of utensils. The recent South African war has created a tremendous demand for aluminum field cooking and messing outfits, thus spreading the fame of aluminum and knowledge of its advantages for portable gear among a class of men who will understand and

appreciate them. A most interesting account of the British army equipment will be found in the March number of the *Aluminum World* of the current year. The German army, as well as the field forces of other Continental powers, are thoroughly equipped with aluminum, and the dead weight per man of superfluous ornamentation and equipment has been considerably reduced, tending greatly to increased efficiency as a fighting unit. In the recent Arctic explorations, in the gold seeking expeditions into the Klondike and Alaska, in the journeys into the Dark Continent, aluminum equipment has played a prominent part; Mr. Wellman built aluminum sledges for transporting his supplies over the ice; the Alaskan gold miners took in many light camping and cooking outfits, and Dr. Carl Peters had with his expedition an aluminum steam launch in portable sections.

Aluminum in Shipbuilding.

Five years ago the well-known shipbuilding firm of Yarrow & Co. of England built the first aluminum torpedo boat, and while a second craft of this description has not been since constructed so generally of aluminum, yet two of the latest additions to our navy, the torpedo boats "Craven" and "Dahlgren," have their observation towers, hatch covers, galleys, cowls and many minor parts made of aluminum. These boats were built by the Bath Iron Works of Maine, and the aluminum details of construction, embracing the use of rolled edges and structural shapes, plates and riveted work, were conceived with the approval of Chief Constructor Philip Hichborn of the United States Navy, who looks forward with interest to the tests of time and the wear and tear of service to demonstrate the practicability and adaptability of aluminum for ship construction and fittings. The American sloop yacht "Defender" was built of aluminum plates from water line to deck level, the submerged plating being bronze, which arrangement tended to considerably lower her center of gravity, insuring increased stability. These aluminum plates, which were carefully and thoroughly painted, gave good satisfaction and are still in service. Certain plates in the stern had to be replaced, as well also as smaller parts and fitting, due to corrosion and electrolytic action and wear and tear. In general this application was highly satisfactory and encouraging.

Aluminum Powder and Leaf.

Aluminum powder and thin beaten leaf are now largely used for securing decorative effects in the arts, as silver paint, and for printing and bookbinding, having almost entirely replaced the silver bullion leaf formerly used. The powder is also mixed in the form of a paste for ink in printing coarse cotton tinsel fabrics, in gaudy design for the Oriental trade. A paint called in the trade pegamoid, aluminoid or aluminum bronze paint, is largely used for coating architectural iron work, lamp posts, letter boxes, elevator grilles and cages, and kindred applications, and has proved highly satisfactory. Overtures have been made to the Public Building Commissioners to paint the outside of the Philadelphia City Hall tower, to restore it to an aluminum luster as originally intended, and far brighter and more durable than the dismal slate-blue of the unknown electro deposit now upon the iron work. Aluminum powder has found an excellent and successful use as a mixture for making photographic flashlights, being cheaper than magnesium and devoid of the pungent odor or unpleasant smoke incident to the combustion of the old magnesium powder.

A recently developed and tremendously successful application of aluminum is in flat, smooth plates for use in lithographic printing. The thin aluminum plates make excellent impressions and are quickly replacing the old heavy lithographic stones, one of the great advantages of aluminum being due to the possibility of its application to the rotary press, as well, also, as to its lower cost.

Aluminum Fancy Articles.

Aluminum hairpins are being made by the million, thus disposing of a goodly weight of wire. These hairpins give excellent satisfaction and have been well received by the trade, who report a steady and increasing demand. Thimbles by the thousands of gross are made by several concerns in the United States and abroad, and several tons of sheet aluminum are yearly thus employed. The metal, however, is rather soft for this purpose, as the hard steel needle soon perforates the thin aluminum shell. For ferrules and ornamental bands, for canes and umbrellas, the metal has been successfully applied. A large use of aluminum has developed for making metal combs, brush backs, mirror frames and a host of toilet and fancy articles, useful as well as ornamental. In fact, it is quite impossible to enumerate the myriad articles now being made of aluminum. One might as well make up a list of everything so far manufactured out of sheet or wire in brass, copper or nickel, tin sheets, steel and iron, and such combinations thereof

as form the materials out of which all known metal devices have thus far been manufactured, for aluminum is quietly, steadily and surely encroaching upon the domain of the metals mentioned, and with the development of its special alloys this march of conquest will proceed with ever increasing acceleration.

Coins and Medals.

The metal lends itself readily to working in the minting dies, and many very pleasing and durable effects have been obtained. Many tons of metal are yearly used in the making of coins, medals, checks, tags, religious and commemorative medallions and insignia. Artistic and permanent effects have been obtained in die work and minting by our American pressmen.

In conclusion, a few words quoted from a recent private letter to the writer, from Dr. Joseph W. Richards, who is to-day one of the best authorities on the subject of aluminum industry, will be interesting. In reviewing the wonderful growth of the industry and the success of aluminum, he says: "Is not the prospect gratifying to us who have befriended the metal, so to speak, in its infancy, have mothered it, fathered it, and even wet-nursed the struggling infant with our own substance—i.e., with money out of our own pockets?"

Baker's Stove Scheme.

The daily papers have had during the week detailed articles conveying the idea that the stove manufacturers of the country are at last going to accept the invitation of John W. Baker to form the National Stove Mfg. Company, with a capital of \$60,000,000. It is understood that a charter was secured some time ago in Delaware. The options alleged to have been obtained vary from 140 to 200, according to the reports in the different papers. A call has been issued for a meeting to be held in Chicago on October 16, but inquiry in New York fails to discover any representatives of the different houses who are going to attend. Among the prominent concerns referred to in the papers as having given options are the Cribben-Sexton Company, but to a representative of *The Metal Worker* William H. Cribben denied that any such option has been given. It is doubtful if any of the others have given an option with serious intent. The want of stability to the whole story and scheme is reflected in the statement that "the financial basis of the big deal has not been definitely settled upon, nor have underwriters been selected to finance the deal."

This seems to leave the whole matter in the same condition in which it was left at the impromptu meeting at the close of the stove convention at the Waldorf-Astoria in New York last May, when a few of the hard headed business members of the stove manufacturing fraternity soon discovered that there was nothing substantial behind the somewhat vague proposition. After some inquiry no evidence can be discovered that there is any widespread desire among the stove manufacturers for such a combination. In the absence of any such desire there is some wonder that the subject is again brought up at a time when its prominence can have nothing but an unsettling influence on the trade.

J. F. Taylor, Edward N. Ohl and A. W. Thompson of the Republic Iron & Steel Company were in Youngstown, Ohio, last week looking over their properties in that district. In an interview A. W. Thompson said: "The Republic Iron & Steel Company have completely overhauled their two furnaces here, at Youngstown, and the one at New Castle, and expect to go into blast as soon as repairs are completed, which will probably be in 30 to 45 days. The mills are not running entirely full at the present time. Orders are coming in fairly well, but the business is not what might be expected for this time of year. About one-half of the Western mills are running at the present time. On account of some very low prices being made in iron and steel, there has been a great deal of foreign business booked, and if the low prices continue, it will eventually make a great deal of export business and we can look for better prices early in the year."

A new feature in the discussions of the cast iron boiler manufacturers is a proposition to support an official who will receive reports from all manufacturers, and be in a better position to suggest methods for preventing irregularities in the market which would be injurious to the trade. It is stated that some oppose the idea, but that enough have been impressed with it to secure for it a trial. It is expected that benefits will result without danger to the interests of those who keep the details of their business well in hand.

The Iron Age

New York, Thursday, October 18, 1900.

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|-------------------------|---|---|---|---|---|---------------------------|
| DAVID WILLIAMS COMPANY, | - | - | - | - | - | PUBLISHERS. |
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The Gold Movement.

A few weeks ago there was a considerable export of gold, which excited little attention and no apprehension here, because it was not due to our foreign indebtedness or to fears of the debasement of the currency here. For a variety of reasons business was very quiet, and banks were unable to find borrowers for all the funds in their vaults, while there was a pressing demand abroad for money, due to wars and rumors of wars and to large speculative operations in some centers. It was evident that when the demand for money should be greater here than abroad the gold would return, and that it is now beginning to do. The autumn is the season of largest monetary requirements here, and the special need for money in Europe has abated somewhat, and gold, following the line of greatest pressure, is moving this way again.

The legitimate commerce of the world is promoted by the equalizing tendency of this free movement of gold. While the effect of the volume of the currency upon prices has been greatly exaggerated by the inflationists, a large supply of money tends to an easy money market and free buying, and sudden contractions of the currency, which business has had no time to readjust itself to, make it difficult to get loans, and so force sales, and a downward tendency of prices. But real money, or specie, will not be held by any country in excess of its usual needs, because while it is in the form of money it is earning nothing; it earns only when transformed into an investment or a loan. Imitation money, or representative money, or substitutes for money—that is, paper—cannot be put into circulation in unlimited quantities without, first, promoting speculation, and, second, undergoing depreciation. It is safe and useful only as it is used to economize gold, being always redeemable in gold, and the amount of gold must be the minimum rather than the maximum amount needed, or much of it will be lying idle most of the time.

The present money movement, therefore, illustrates the excellence of our present system; not that it is perfect; the volume of bank notes should be more responsive to the needs of business; but it is sound. The paper is at par, being redeemable in gold, and the gold moves readily to one country or another, according to the degree of need. For each country there is an elasticity in the gold, the world's stock, which is increasing fast, moving one way or another, according to the pressure. In a year the Bank of France has gained about \$75,000,000 of gold, but rather than have a monetary stringency in London the injurious effects of which must necessarily be felt in Paris and every other monetary center, the Bank of France is willing to supply gold for export. It was said last summer when gold was going out of New York that if it prevented a stringency in London the gold would be more useful to New York there than here. No country can entirely separate its commercial interests from those of the rest of the world, and to the extent that it can accomplish that by a depreciated currency,

which will not be accepted abroad, it exposes itself to violent changes in prices and alternations of speculation and collapse.

Progress in Industrial Arbitration.

Public opinion in this country is steadily shaping itself in favor of the application of the principle of arbitration in the adjustment of all differences between employers and wage earners. We do not mean by this that thoughtful people approve this plan of avoiding strikes, for that has always been true. Indeed, arbitration as a principle has never encountered intelligent and disinterested opposition from any source, unless tardily suggested as a means of terminating struggles which should never have begun, or of covering surrender after an issue has been fought out and decided by the rude expedient of a test of endurance. A consensus of public opinion, if it could be taken, would show that thoughtful people in all grades of society are losing patience with the belligerent spirit which causes so many needless shocks to our industrial prosperity, and that the demand for a better system of adjustment than is offered by strikes and lockouts is becoming so imperative as to warrant the belief that within a very few years at least it must be adopted. The first step in this direction is likely to be the brushing away of all sentimental nonsense as to the right of organized labor to trample on the liberties of others, and to set at defiance the laws by which life, property and individual freedom of choice and action are protected. Unwarranted tenderness with mobs of armed workmen who threaten, intimidate and even attack those who do not join them in voluntary idleness, who are ready to enforce their demands with dynamite and the incendiary torch if employers can be coerced in no other way, and who consider it proper to maltreat the citizen who unconsciously, or in the exercise of his indisputable legal right, fails to respect a boycott, no longer has popular approval, nor even patient toleration. The fact that the recognized leaders of strikes, who can be arrested and indicted, disclaim knowledge of, and responsibility for, such crimes and misdemeanors deceives nobody. The history of all great strikes of recent date shows a gradual increment of offenses against persons and property, all tending to one object—the upbuilding of the power of the trade unions and the attainment of their announced purposes. More stringent laws, and their more courageous enforcement, may be postponed by timid politicians, who are afraid of the labor vote; but such cowardice will soon become politically fatal to those who manifest it, and with the end of violence and crime labor will gain more respect for diplomacy than it now has.

Great reforms in matters touching our social and economic conditions take shape slowly. It is now about fourteen years since plans were adopted for adjusting labor differences by voluntary arbitration under the guidance and direction of State commissions. President Cleveland, in 1886, in a message which attracted much attention, called the attention of Congress to the disturbance of interstate commerce and the injury to the industrial interests of the nation, resulting from the great strikes of that and previous years, and recommended national legislation establishing the means of adjusting by voluntary arbitration such industrial issues as disturbed the relations between States. This referred especially to the tying up of railroads during strikes, but inasmuch as every important contest affecting either production or distribution involves in a greater or less degree an interference with interstate commerce, it was believed that the federal power was

competent to deal with it, if the principle of voluntary arbitration was one admitting of beneficial application. The immediate effect of President Cleveland's message was to stimulate certain States to action along the lines of its suggestions, and New York and Massachusetts established State Boards of Arbitration. In 1888 Congress passed a law providing temporary tribunals of appeal, and one of the boards thus created recommended that the example of New York and Massachusetts be imitated by every State in the Union. Ten years later, in 1898, Congress created a permanent commission to mediate in labor disputes affecting the business of railroads and other agencies of travel and transportation between States, or between the United States and foreign countries. The services of this commission have been inconspicuous, chiefly because no great railroad strike has occurred since the passage of the law creating it. The board consists of the chairman of the Interstate Commerce Commission and the Commissioner of Labor. It has no authority, can take cognizance of a dispute only on the request of one or the other party to it, shall try to adjust the matters at issue by mediation and conciliation, and if they fail, shall endeavor to bring about arbitration. It is a very amiable scheme, but one likely to command very little respect from employers or trade unions. The various State boards of arbitration are all similarly restricted in their powers and duties. They have no right to take the initiative, can exercise no authority, and, being dependent upon voluntary information, rarely learn enough to enable them to advise wisely. The belief of those instrumental in framing the laws creating them, that in the event of labor disputes arising both the parties would lay their claims before the State board and seek a peaceful adjustment, has been disappointed. As the rule the boards have been regarded by the unions as the German peasant regarded the kangaroo in the menagerie: "Well, we must have something to laugh at." The well meaning overtures of the commissioners have been snubbed, and their offers of services treated with scant courtesy. During strikes they stood by like amiable old gentlemen regarding a street fight, anxious to restore peace, but powerless to contribute anything to the desired result. Many strikes have been averted and some terminated by arbitration, but in the instances in which this has happened both sides have desired a peaceful settlement and stood ready to make the concessions necessary to an agreement. Where they have not desired this, no means have yet been devised of making arbitration acceptable. State and national boards are of very limited utility at best, and as at present constituted they are scarcely useful enough to warrant the payment of their expenses. They are heavily, if not hopelessly, handicapped by the lack of any authority to summon witnesses and take testimony, by reason of which the boards are, generally speaking, dependent for their information upon the *ex parte* statements of volunteers as to the issues involved. John M. Davis, secretary of the Illinois State Board of Arbitration, expresses on this subject the opinion which most thoughtful men have reached, as follows:

The power must exist to cause the enforcement of the decisions of the Board of Arbitration in all cases voluntarily submitted by both sides to the controversy. It may be suggested, also, in view of the growing effect of the strike and the lockout as affecting the public good, that in all cases involving the public interests to any considerable extent a State Board of Arbitration ought to be clothed with authority to inquire fully into the merits of the controversy, even though not petitioned by the parties directly involved, and to that end ought to have undisputed power to require the attendance and testimony of witnesses and the production of necessary

books and papers. Of course decisions in such cases could not be legally enforced; their chief value would be their effect upon public opinion.

To what extent arbitration should be compulsory is a question on which wide differences of opinion exist. The success of the New Zealand system, fully discussed in these columns a few months ago, is gaining many adherents to the plan of enforced arbitration, especially in cases where either party desires it. The precedent for this is found in our system of civil jurisprudence. Either party to an issue in equity may take it into court for arbitration, and the other party must respect and be governed by the judgment rendered, even though he did not desire any outside interference. The nearest approach yet made in this country to compulsory arbitration is in Illinois, where the law was lately amended by the addition of the following provision:

In the event of a failure to abide by the decision of said board in any case in which both employer and employees shall have joined in the application, any person or persons aggrieved thereby may file with the clerk of the Circuit Court, or the County Court of the county in which the offending party resides, or in the case of an employer in the county in which the place of employment is located, a duly authenticated copy of such decision, accompanied by a verified petition reciting the fact that such decision has not been complied with and stating by whom and in what respect it has been disregarded. Thereupon the Circuit Court, or the County Court (as the case may be), or the judge thereof, if in vacation, shall grant a rule against the party or parties so charged to show cause within ten days why such decision has not been complied with, which shall be served by the Sheriff, as other process. Upon return made to the rule, the court, or the judge thereof, if in vacation, shall hear and determine the questions presented, and to secure a compliance with such decision may punish the offending party or parties for contempt, but such punishment shall in no case extend to imprisonment.

This law has not yet been tested, as no joint appeal to the State Board has been taken since it was enacted. The difficulty in testing it consists in the fact that it is applicable only in cases where both parties to a labor difference have joined in seeking arbitration. Perhaps public opinion is not yet ready for an enactment conferring the right upon either party to an issue of this character to demand arbitration and enforce the rulings of a State Board through the courts, but until this is possible such boards have a very limited range of usefulness. Meanwhile, there are indications of a growing conviction among intelligent workmen that arbitration will better safeguard their interests than strife conducted along the lines hitherto followed. At the recent annual convention in this city of the International Wood Carvers' Association the following preamble and resolutions were adopted with great unanimity and enthusiasm:

Whereas, Our own experience and the experience of all labor organizations have taught that while the strike as a weapon of defense cannot be abandoned, it has long been apparent that as a means of adjusting grievances it is not the most satisfactory, while it is the most expensive weapon; and,

Whereas, All modern tendencies are toward the furthering of conciliatory methods, especially as between the employer and employed, upon whose harmonious relations so much of the welfare of the community depends; therefore, be it

Resolved, That this convention emphatically indorse the principles of conciliation and arbitration, as applied to our trade disputes, and especially recommend to the incoming officers the applying of these principles to their future relations with employers; and, further

Resolved, That the prosecution of these principles being an established policy of the International Wood Carvers' Association, we impress upon our members the necessity of adhering faithfully to all agreements with employers.

That we are not making more rapid progress in this direction of establishing the principle of arbitration in industrial disputes is to be regretted—that we are mak-

ing any progress is encouraging. It is unfortunate that so little uniformity exists in the arbitration laws of the different States, but this can scarcely be corrected until one State shall adopt a law under which results of tangible advantage are reached. It is well to be conservative in matters affecting the industrial interests of the country, but a little less timidity in dealing with arbitration would show that its practical difficulties are much less serious than they now appear to be. In any case, however, a sharp distinction should be made in making compulsory arbitration applicable alone to such industries in which the general public has definite and acknowledged rights. This would include transportation and corporations engaged in exploiting public utilities. If long experience had taught that it possessed advantages there, then the question of making it applicable to industrial pursuits generally might come up for serious consideration.

What Constitutes Greatness.

An interesting topic of discussion has been precipitated in Western intellectual circles by the sentiments reported to have been expressed in a class lecture by a professor of literature at the University of Chicago. Referring to the position of America intellectually, it is alleged that he made the following statement:

I am tired of hearing America criticised for its lack of artistic sense and creative power. Hereafter, when people ask me who among Americans have shown a really wonderful creative genius and stand out head and shoulders above other men as Shakespeare does, I shall point to John D. Rockefeller and George M. Pullman.

With their own individual intellects they have performed two herculean tasks, and to-day their power is felt throughout the world. Shakespeare pictured to himself a scene and put it into words; these men conceived great industries, where thousands of men might find employment in producing what millions of people need. Who shall say that their genius was less than the genius of Shakespeare? It has a far reaching, practical influence, and in my opinion it will be just as lasting.

Inasmuch as Mr. Rockefeller has been a very generous supporter of the University of Chicago, the rather unfair imputation is made that the professor's allusion to him has a motive, being designed to bear further financial fruit for the institution. Those who take this view of the incident grow satirical, and make comparisons between Homer and Russell Sage, Milton and Havemeyer, Goethe and Mrs. Hetty Green. They ask whether men who through genius or inspiration or devotion to high principle have been most influential in strengthening the understanding and the ideals of mankind are precisely on a plane with those who by dint of shrewdness, energy and caution have brought together many dollars and thus acquired power. Those who worship at the shrine of intellect as developed in the direction of literature and art would be apt to take this view of the subject, and in contemplating an extraordinarily successful business man would be unable to fully appreciate the man because of their highly cultivated antipathy to his dollars. Perhaps the critics may be right in the motive which they ascribe to the professor, but he has unquestionably directed a current of thought in line with modern developments of brain power. The world has passed through various eras, in which different classes of men were regarded as having achieved greatness. At one time the soldier stood far above his fellows in securing that peculiar tribute from them which we call fame. At another time it was the sculptor, the poet, the painter, the orator, the preacher, the musician. In every case it was necessary for a man

in order to achieve fame to do something far beyond the powers of ordinary mortals, indicating genius in that particular line. The work performed by him might not always be elevating, and instead of appealing to men's higher natures it at times ministered to their prejudices or pandered to their vices, but its brilliancy or its originality won the homage of the multitude.

In these latter days we have come to an era of utility. Everything material is being turned to the use of mankind in a manner never before known or even dreamed of in the history of the world. The health, the comfort, the convenience of the people never before received such consideration. In the vast work of utilizing the crude resources of the earth to the highest advantage of its inhabitants, leaders of men of a new type have sprung into existence. They have been aptly termed captains of industry. Among them we find some of great distinction, who have acquired such vast power or such commanding pre-eminence that they must be conceded to possess genius in this particular direction. It has not come through the possession of wealth. Dire poverty marked the early days of nearly all of them, especially of the most eminent. It has not come through sordid accumulation. The brightest characters among these leaders of men have always been generous and open handed. It has not been gained through mere craftiness. The seeds of destruction would in that case have been planted with the very beginning of success. Such men as these are abused and vilified, but the abuse and vilification are largely the products of envy and injustice. It would be unbecoming and invidious to particularize, but in the ranks of the business men and manufacturers to-day are to be found those whose achievements make them worthy to rank with the great men of past generations who wrought only to please the mind or the senses. And among these men of creative and constructive genius the greatest are Americans.

Franklin Institute Meetings.—The Mining and Metallurgical Section of the Franklin Institute, Philadelphia, Pa., held their stated meeting in the lecture room of the institute Wednesday evening, September 10, President Joseph Richards occupying the chair. At the conclusion of the routine business, Paul Kreuzpointner of the Pennsylvania Railroad Company, Altoona, Pa., was introduced, who discussed the discussion of his own paper, "Riddles Wrought in Iron and Steel," which was read before the section in May, 1900. Mr. Kreuzpointner's remarks were along the line of Professor Henry M. Howe's discussion, relative to the proportionate percentage of carbon necessary in cast iron in order to give same its highest combination of strength. The contributed discussion of A. E. Outerbridge, H. M. Howe and Wm. R. Webster was also taken up. Mr. Kreuzpointner's paper and the discussion of same has created considerable interest among the members and foundrymen and quite a representative number were in attendance.

Jones & Laughlins, Limited.—The report in the daily press that Jones & Laughlins, Limited, of the American Iron & Steel Works, at Pittsburgh, will build a new rod mill to have a capacity of 500 tons of rods a day is untrue. The facts are that this concern supplies a good deal of material in rounds from 3-16 to 3/4 inch, to makers of rivets and bolts. To save waste, the rivet and bolt makers desire to get this material in coils, instead of cut lengths as heretofore. To take care of their large trade, Jones & Laughlins have decided to put in a number of reels and also some new stands of rolls. The roll trains they will build themselves, while the reels will be installed by Garrett & Cromwell of Cleveland. Should Jones & Laughlins find after they get these new reels and mills in that they have not enough trade to take their product, they will then be in position to furnish wire rods. They do not intend to make rods a feature of their business by any means, but, as stated, will be in position to furnish rods should it be necessary to make them. They will not be ready, however, before the first of the year or later.

PERSONAL.

Henry Halliday of the Consett Iron Works, Durham, England, is now in this country.

Guy R. Johnson, for several years manager of the blast furnaces of the National Steel Company at Youngstown, has been appointed manager of the Duquesne furnaces of the Carnegie Steel Company, at Duquesne, succeeding Charles McCreery, who has been appointed superintendent of the entire plant and blast furnaces of the Dominion Iron & Steel Company now being erected at Sydney, Cape Breton, Canada.

Charles Lockhart, a well-known capitalist of Pittsburgh, and who is interested in the Lockhart Iron & Steel Company in that city, has been appointed a director of the Western Union Telegraph Company.

Myron C. Wick, formerly chairman of the Executive Committee of the Republic Iron & Steel Company, but who was relieved at his own request, has returned to Youngstown, Ohio. Mr. Wick has no definite plans for the future.

Thomas Morrison, superintendent of the Edgar Thomson Steel Works of the Carnegie Steel Company, at Bessemer, has returned to Europe.

David Williams, president of the David Williams Company, publishers of *The Iron Age*, sails for France to-day.

L. C. Hanna of M. A. Hanna & Co., Cleveland, has returned from a five months' stay in Europe.

Duncan MacDougall has resigned his position as superintendent of the Western Works of the American Steel Casting Company and has been appointed general sales agent of the Pittsburgh Steel Foundry, with offices at 927 Real Estate Trust Company's Building, Philadelphia, Pa.

The following reappointments and changes have been officially announced by the Sloss-Sheffield Steel & Iron Company of Birmingham, Ala.: J. M. Lewis, assistant to the president; John W. McQueen, secretary and treasurer, in charge of the sales department; Priestly Toulmin, general manager in charge of furnaces, coal mines, coke ovens, engineering, &c.; A. G. Palmer, general agent in connection with the traffic and sales departments; Charles H. Schoolar, auditor; Henry Hiden, purchasing agent. Messrs. Lewis and Palmer went South with Edward C. Hopkins, the new president. Messrs. McQueen, Hiden and Schoolar retain departments already held by them. Mr. Toulmin is advanced from the post of chief engineer. The following changes have also been made: J. H. McCune, in charge of furnaces, has resigned; John H. Means has succeeded Mr. McCune; Gentry Hillman has been placed in charge of the furnaces at Sheffield and Florence.

Theodore Beeson, who has for some time filled the position of chemist at the Niles Tool Works, Hamilton, Ohio, has been appointed foundry manager of the Chandler & Taylor Company, Indianapolis, Ind.

George Phillips, who has for several years been general purchasing agent for the Adams & Westlake Company, Chicago, has been transferred to Philadelphia, where he will take charge of the company's important branch at 2042 North Tenth street. Henry Miller, who has been connected with the same department, succeeds Mr. Phillips as general purchasing agent.

P. H. Mynahan, formerly manager of the Humbert Tin Plate Company's plant at South Connellsville, Pa., has associated himself with the Southern Mfg. Company, who have established a steel hoop mill at Atlanta, Ga.

The technical and statistical library belonging to the late Joseph D. Weeks, at Pittsburgh, has been donated by his widow to Carnegie Institute, in that city. The library is a most valuable one, containing as it does many books which are now out of print and which contain information that cannot be obtained from any other source.

W. W. Waterson, superintendent of the American Shipbuilding Company's Lorain yards, will become general manager of the company's interests at Buffalo. Superintendent Jeffery of the Bay City yard will go to Lorain. Extensive improvements are contemplated for the dry docks at Buffalo.

A school of botany is to be erected in Schenley Park, Pittsburgh, near Carnegie Institute, the expenses of which will be borne by Henry Phipps of the Carnegie Steel Company. The building is expected to cost about \$25,000.

F. T. F. Lovejoy, formerly secretary of the Carnegie Steel Company of Pittsburgh, has purchased a large site

of land on Braddock avenue, in that city, and will erect a fine residence.

James A. Campbell has resigned his position as district manager of the Republic Iron & Steel Company, embracing Youngstown, Ohio, Sharon and New Castle, Pa. His resignation takes effect October 31. The Republic Iron & Steel Company have been abolishing the offices of district manager, and hereafter the duties of these offices will be performed by W. E. Taylor, recently made general manager of the Republic Iron & Steel Company. Mr. Taylor has a personal knowledge of the mills in Youngstown, New Castle and Sharon owned by the Republic Iron & Steel Company.

Next week Charles J. Guthrie, president of the American Steel Hoop Company, will be married to Mrs. F. J. Lehman, the widow of his former partner in the firm of Naylor & Co.

OBITUARY.

GEORGE B. BERGER.

George B. Berger, conspicuously identified with the iron industry of the Shenango Valley, died at New Castle, Pa., last week of paralysis. Mr. Berger was born in Pittsburgh 51 years ago, and was a son of Andrew B.



GEORGE B. BERGER.

Berger and Rosema Reis. His father was active in business in Pittsburgh until shortly before the Civil War, when he formed the partnership of Reis, Brown & Berger, with George C. Reis, his brother-in-law, and William H. Brown. The firm built a rolling mill and blast furnace at New Castle, and the elder Mr. Berger remained there until his death, ten years ago. Mr. Berger received his education at the Pennsylvania Military Academy, at Chester, Pa. He entered the iron business upon leaving school, and became general manager of the Raney & Berger Iron Company. He was also a director of the Shenango Valley Steel Company from their organization and was their treasurer until their absorption by the National Steel Company last year. Deceased had not been in active business for some time, and it was his intention to remove to New York for the winter when paralysis overtook him.

DANIEL L. COBB.

Daniel L. Cobb of Chicago, sales agent for the Sloss-Sheffield Steel & Iron Company, died in that city on the 13th inst., after a short illness. Mr. Cobb was 45 years of age and was born at Lusby, Ky. His entire business life was spent in connection with the iron trade. He was employed as a young man by the Peekskill Iron Company, Peekskill, N. Y., and was with them for two years learning the manufacture of iron; thence he went to New York City and served as an apprentice in a foundry for three years, thoroughly mastering the trade of molder. He then became a partner in the firm of Hugh W. Adams & Co., New York, pig iron and commission merchants, representing Northern and Southern furnaces, embracing among the latter at different times the Tennessee Coal, Iron & Railroad Company and the Sloss Iron & Steel Company. In 1894 he removed to Chicago to become the direct representative of the Sloss

Company, and held that connection until his death. His excellent practical knowledge of the iron business gave him a strong hold on the trade of foundrymen, which he steadfastly retained by his unfailing courtesy.

A Warning Against Frauds.

Under date of October 10 A. D. Cook, manufacturer of tube well supplies, steam pumps, &c., of Lawrenceburg, Ind., writes to us as follows:

"A little over a year ago a party, giving his name as H. C. Harter, H. C. Carter, L. M. Dickinson, S. H. Dickinson and various other names, started from about Warren, Ohio, and visited West Virginia, Pennsylvania, Maryland, New York, finally reaching Boston. Wherever he stopped he bought a few goods in my name and left. From Boston he turned West and kept up his buying until he got to Illinois. From that time on I heard nothing from him until about a week ago. He turned up in Cleveland, Ohio, and Ann Arbor, Mich. His purchases have generally been lubricators, injectors, belting, small valves, &c., such as would be used on threshing engines and farm machinery, the bills generally amounting to from \$3 to \$25. We have, of course, lost nothing by him, as we have paid none of the bills, but we have been annoyed considerably and others have lost."

Another case comes to us in the form of the following letter from a widely known dealer in machinery:

"It would be well for you to mention in whatever form you thought best, in the way of a warning, that Edwin C. Davis, who lately started to fit up a new shop at Fort Edward, N. Y., called the Eureka Machine Works, had purchased a number of machine tools, a boiler, supplies, pipe, &c., and disappeared without paying for them. Some of the property he disposed of himself as soon as it came into his hands without moving it from the railroad. The sheriff sold a portion on the 8th that was levied on—and he is likely to turn up somewhere and attempt to dispose of whatever remains. That he has no right to do, for he is a 'dead beat' of the worst kind, and by publishing this notice it may check his operations."

Overcoming the Range Peddler.

At the request of the hardware trade in that section, Secretary Thomas McCracken of the Minnesota Hardware Association has prepared a paper on how retail hardware dealers may best fight the itinerant range peddlers, who now swarm over the farming districts of the Northwest and victimize the farmers of that region to their detriment and that of the legitimate stove and range dealers. Mr. McCracken's paper, which has been sent out to all the members of the Minnesota Association, runs as follows:

It is now about the time of the year when the itinerant peddler of steel ranges will appear in the land, assuring the customers of the retail dealers that he sells the only non-breakable, non-shrinkable, all-around, up to date, most perfect thing that they ever gazed upon in the way of a range. He will, without the ceremony of an invitation, drive into the farmer's front yard, dump his range out on the ground, hitch on a joint of pipe, set the yard gate alongside for a wind break, use up all the kindling wood to build his fire, order a pan of biscuits to be baked, from the now well nigh frightened to death housewife, chuck in more wood, notwithstanding every stick is precious and has to be hauled a long distance, sing a song or dance a jig, flirt with the girls until they feel as if they were coming down with the measles, hammer the stove plates with an utter abandon—"Can't break them, you know," "warranted for any length of time," "don't want any money down on the sale, simply their note, one and two years to run, no interest and only \$68 to \$70."

Now, Mr. Retailer, these fellows may come your way, and if you will adopt the plan pursued by members of our hardware association in the central and southern portions of the State you will rid yourselves of them forever.

As soon as the range peddler appears in your town prepare to follow him. Put into your delivery wagon a good No. 8 or No. 9 square range, and then let him set the pace and route—don't lag behind, but be right in sight all the time. Whenever he stops, you stop. Whenever he drives into a farmyard you do the same. Let him dump his stove; you don't have to dump yours, as you merely brought it along for comparisons, and will gladly sell it for from \$35 to \$40 less than he dare offer his for. Simply stay with him. Be a sweet comforter to your trade, and a thorn in his side, at farmhouse No. 1, No. 2, No. 3, or any other number at which he may stop during the day. When he wearily turns toward town be with him there, for then is your time to laugh. If you have a fellow hardware dealer let him be ready to

follow the next day, and so on until you drive the range peddler out of your county. The ranges he sells will be *nil*—and you will find your trade about doubled during the year.

New Publications.

MOLDERS' TEXT-BOOK. By Thomas D. West. 461 pp., illustrated, eighth edition. John Wiley & Sons, New York, publishers. Price, \$2.50.

In the preface to the eighth edition of this work, under date of August, 1900, the author states: "Having recently thoroughly revised 'American Foundry Practice,' and placed it in keeping with the advance of the general workings of founding, it is but proper that the same interest should be displayed in revising this work. By comparing this edition with the last, readers will find this to have been done in such a manner that all those competent to judge, the author believes, will say that this work is as valuable to the trade to-day as when it was first written in 1895." Having followed the author's advice in the above and compared this edition, page by page, with the first one, the only changes we discovered were in number but two. In the last paragraph, page 390, in both volumes the author refers in the first edition to the employment of electricity for the driving power for cranes, and states that "how successful or practical its application for foundry cranes will prove is yet to be seen." In the edition under review, he adds "pneumatic power," and states that both this and electric power have proven of such advantage that it is now rare to find steam or hydraulic power being applied to foundry cranes. This portion of "a thorough revision" occupies a space of about six lines.

The second and most important addition or alteration to the volume that we can find is the short preface to the eighth edition quoted above in which the author makes the bold statement that he has placed his book in keeping with the advance of the general workings of founding.

BLUE PRINT MAKING. Size, 5½ x 8 inches. 28 pages. Bound in blue paper covers. Published by David Williams Company, 232 to 238 William street, New York City. Price 25 cents, post-paid.

The extent to which blue prints are used at the present day in connection with building operations, as well as in various other branches of trade, renders interesting and valuable, contributions to the literature on the subject of preparing them. Numerous inquiries have been received in the past for a work on blue print making, and with a view to meeting these requirements we have arranged in book form some of the articles on the subject which have appeared in the columns of this journal. The little book in question embraces directions for constructing the printing frame, preparing the paper and making prints of various kinds. The articles are contributed by authors well known to readers of *Carpentry and Building*, and the subject is handled in a way to strongly appeal to the architect, builder, contractor or mechanic who is desirous of making blue prints for his own use. There are also included in the work a number of queries and answers, relating to blue print making, which lately appeared in the Correspondence department of this paper.

ANALYSES OF PIG IRON. By Seymour R. Church, San Francisco, Cal. Price, \$2.50.

Seymour R. Church, who is the San Francisco agent of Rogers, Brown & Co., has taken the pains to collect from the producers of pig iron in the United States and in foreign countries analyses of the different grades of pig iron which they make. In very many cases these seem to be typical, in others the figures are apparently merely approximate. The utility of such an undertaking is obvious for a number of such founders who are able to interpret an analysis as to the value of the iron which it represents for their particular purposes. Mr. Church has certainly been at much pains to collect the material, and he has certainly presented it in an exceedingly handsome style, there being also a number of fine illustrations.

SUPPLEMENT TO THE IRON AND STEEL WORKS DIRECTORY. Second edition. Published by the American Iron and Steel Association, Philadelphia, Pa.

Mr. Swank has just completed a second edition of the consolidations of iron and steel companies, including in the list a number which were not referred to in the earlier report. Some of these were organized since he published his first Supplement, notably the American Bridge Company, the Crucible Steel Company of America, the American Sheet Steel Company, and the Standard Chain Company. He has somewhat expanded

the list, too, by including the Carnegie Company, Jones & Laughlins, Limited, and the Tennessee Coal, Iron & Railroad Company. For the details as to the different plants Mr. Swank refers to the last Directory.

Pencoyd Bridges.

There has just been issued by the Committee on Science and the Arts of the Franklin Institute of Philadelphia a report on the exhibit of the Pencoyd Iron Works at the National Export Exposition held in Philadelphia last year. The committee of the Institute, of which H. R. Heyl was chairman, in awarding to the Pencoyd Iron works the Elliott Cresson gold medal, refers as follows to the special features in the construction and erection of several important bridges recently built by the company—namely, the Niagara and Clifton bridge, at Niagara Falls; the Athara River bridge, over the Athara River, for the British Government, and the Delaware River bridge of the Pennsylvania Railroad Company, near Philadelphia:

The Niagara-Clifton Bridge.

In the case of the Niagara bridge, the conditions were very difficult and exacting; first, the center or main span over the river is of unusual length (more than 200 feet longer than any arch structure ever before attempted), and, second, the great depth of the river and the rapidity of the current rendered false works entirely impracticable. The patent determined upon was that known as a two-hinged arch, consisting of two complete arch trusses resting on heavy cast steel abutments, built into the solid rock at each side of the river, and rising to a height of 150 feet at the center. These are held together by lateral bracings, in the usual manner, and the roadway is carried by vertical posts rising to the level of the tops of the arches. The most interesting features in this case are the method adopted by the designer for closing up the arches at the center, and the accuracy with which his plans were carried out. Owing to the absence of false works, it was of course necessary to build out the structure from either side of the river simultaneously on the cantilever system, until they should meet in midstream. To sustain the great weight of the arches during construction, heavy anchorages were built on both sides of the river, from which lines of eye bars were carried over the approaches and attached to the upper chord. These were removed when the bridge was completed.

In all structures of this sort economy of material is a matter of the greatest importance, not only on account of expense, but for the purpose of reducing the dead weight to be carried. To this end the most careful calculations are made to ascertain the minimum weight of materials required to carry the prescribed load added to the weight of the structure itself and at the same time provide an ample factor of safety. The strains to which every member of the structure would be subjected were carefully figured out, and the section and weight required determined accordingly. The ultimate strength of the whole structure depended, therefore, on the accuracy with which every part was made to carry its calculated strains. To secure the perfect adjustment of the strains in the arches of the Niagara Bridge was the object of the method of closing up adopted. The method was as follows, quoting from a paper submitted by the company:

"The deflections were carefully figured and the toggles for the final adjustment set so that, according to figures, the lower center panel point ought to have come exact at the normal temperature. It was then expected to close up at this lower panel point with a pin, so that after the anchorage was removed the structure carried itself as a three-hinged arch. In this condition the two upper central panels were figured to be shortened $2\frac{1}{4}$ inches from the theoretical length. These two chord panels were therefore shortened 3 inches each and the so obtained opening of 6 inches was expected to be reduced in this three-hinged arch condition to $3\frac{3}{4}$ inches. By an application of a compressive strain of 370,000 pounds in these middle panels (which stress was actually applied by hydraulic jacks), the original opening of 6 inches was supposed to be obtained and the arch then to be closed as a two-hinged arch. The proper corrections for the variations in temperature of course had been figured. The lower panel point was closed a little below normal temperature with $\frac{1}{4}$ -inch opening. At a normal temperature in the three-hinged condition $3\frac{3}{4}$ -inch opening was obtained, which opening, by the application of about 370,000 pounds, was increased to 6 inches. By thus weighing the strain in the upper chord of the center of this arch all undesirable strains due to cantilever erection are eliminated from the structure, and the condition of the strains in the structure made to correspond with the figures. After this work was finished it was discovered that a German engineer had conceived

and adopted the same method of closing up a bridge arch, but entirely unknown to the Pencoyd Company's engineers; another example of the simultaneous invention of an important principle by people widely separated and unknown to each other.

"To show the wonderful degree of accuracy attained in the preparation of the materials, in the measurements at the river in locating the abutments, and in the erection of the bridge, we quote from a letter from the engineer in charge of the work, reporting to his company the success of the plans for closing up the arches:

"When the last bottom chords were put in place there was just $1\frac{1}{4}$ inches clearance between the face surface, or $\frac{1}{4}$ inch clearance for the pin. The temperature was a little below 60 degrees. This shows that our measurements and the shop work were practically exact. The alignment and the respective elevations of the two halves at the center were so nearly right that they were pulled into line with a steamboat ratchet. The toggles were not used at all except to slack off after the center pin was driven. The work all came together in a most gratifying manner."

Athara River Bridge.

"This bridge consists of seven spans 150 feet each, which, due to local conditions, had to be erected without false work. One span was put up temporarily on shore and the first river span hung out from this and erected by a steel traveler running on the top chord and by anchoring the first span down with about 60,000 pounds of steel rails. Then after the removal of the temporary span the second river span was erected in the same way, using the first one as an anchorage, &c. To overcome the deflections of the spans and the effects of the camber on the position of the end which had to be coupled up over the far pier, the ends were raised 2 feet by shortening the coupling bars over the pier carrying the anchorage span and the cantilever span. The end shoes were then figured to land $4\frac{1}{2}$ inches above the piers. The actual distance measured varied from 4 to 5 inches. While single spans have previously been erected this way by building out a cantilever from both shores and closing in the middle, it had never before been attempted to erect a large number of spans in this way by hanging each span out as a cantilever for its full length.

Delaware River Bridge.

"The Delaware River Bridge of the Pennsylvania Railroad has approaches 2468 feet long, three fixed spans of 533 feet, center to center end pins, one draw span of 323 feet, center to center end pins, all double track. The fixed spans were so designed that no eye bar was tapered more than 1-20 inch per foot, and that the eye bars in the same panel have practically the same taper, also that all members are absolutely straight when they get their maximum strain. This reduces the secondary bending strain due to the use of a secondary system of the members considerably (in the end posts over 33 per cent.). The roller end rests on seven cast steel segmental rollers 18 inches in diameter, which are held in position by a gear tooth at each end of the middle roller. The four webs of the chords and end posts are prevented from shifting sideways by vertical diaphragms near each pin hole. The floor was put in place after the trusses were swung entirely free. All stringers were kept about 1-16 inch long, and the connection angles had a 6-inch leg against the floor beam, with rivets as far as possible away from the stringers. Through this arrangement the pull on the connection of the stringers to the floor beam due to the stretch of the lower chord of the main span (about 3 inches) was overcome. The draw span was entirely center bearing. This is the heaviest draw where the center bearing construction has been used, and has a great many novel features in the machinery. Entirely new is the counterbalanced latch, which is provided with a wheel at the lower end, and the catch for which is so arranged that if the draw gets to the closing point with too fast a speed the latch will jump over the opening without jarring the bridge."

Michigan's New Factories.—Michigan's record of new factories during the last four years, as shown by a canvass just made by State officials, is 1005, not one of which was in existence prior to January 1, 1897. At the time of the canvass these institutions were employing a total of 23,000 persons, and their pay rolls aggregated \$33,000 a day, or approximately \$1,500,000 a year. These new institutions are scattered all over the State, every county being represented in the enumeration. The most extensive among them are the nine beet sugar factories and the several cement factories that are being operated. One of the results of the increased avenues of employment is the great difficulty that is now being experienced by lumber operators in securing men for work in their camps, even though the wages offered are nearly 40 per cent. higher than four years ago.

Remarkable Coke from Illinois Coal.

The Universal Fuel Company of Chicago, who are operating a number of ovens in that city in coking Western coal by the Hemingway process, are making gratifying progress in securing commercial results. They have recently tested a quantity of coal from the Big Muddy district of Illinois. The resulting coke was submitted for an expert opinion to Robert W. Hunt & Co., Chicago, who made a report on it, dated October 1, of which the following is a copy:

We carefully selected at your company's ovens, Chicago, coke which had been made from Scott-Wilson coal; taking pains to secure a sample which would represent the average of the coke. Our analysis of this sample gave the below results:

Scott-Wilson Coke Analysis.

| | Per cent. |
|----------------------|-----------|
| Moisture | 2.55 |
| Volatile matter..... | 1.82 |
| Fixed carbon..... | 81.71 |
| Ash | 13.92 |
| Total | 100.00 |
| Sulphur | 0.83 |

We secured from a manufacturing establishment in Chicago an equally carefully selected sample of Connellsville coke, which represented the establishment's daily supply. The result of the analysis of this sample gave the below result:

Connellsville Coke Analysis.

| | Per cent. |
|----------------------|-----------|
| Moisture | 0.05 |
| Volatile matter..... | 1.97 |
| Fixed carbon..... | 82.60 |
| Ash | 14.93 |
| Total | 100.00 |
| Sulphur | 0.83 |

We selected from both samples pieces of coke, from which we had cubes prepared, and subsequently tested them for crushing strength.

CRUSHING TESTS.

Crushed Across the Grain.

| Scott-Wilson. Size of specimen. | Area crushing surface. Square inches. | Load. Pounds. | Crushing load per square inch. Pounds. |
|------------------------------------|---|------------------|---|
| 1.28 x 1.447 x 1.447..... | 1.852 | 5,550 | 1,375 |
| 1.116 x 1.10 x 1.114..... | 1.227 | 2,070 | 1,687 |
| 1.064 x 1.093 x 1.093..... | 1.163 | 1,180 | 1,015 |

Crushed with Grain.

| | | | |
|---------------------------|-------|-------|-------|
| 1.124 x 1.175 x 1.1..... | 1.320 | 2,610 | 1,985 |
| 1.10 x 1.208 x 1.14..... | 1.328 | 1,480 | 1,114 |
| 1.035 x 0.955 x 1.04..... | 0.985 | 2,060 | 2,085 |

Crushed Across Grain.

| Connellsville coke. Size of specimen. | Area crushing surface. Square inches. | Load. Pounds. | Crushing load per square inch. Pounds. |
|--|---|------------------|---|
| 1.317 x 1.278 x 1.298..... | 1.683 | 2,110 | 1,254 |
| 1.1 x 1.105 x 1.11..... | 1.215 | 1,310 | 1,078 |
| 1.228 x 1.379 x 1.292..... | 1.693 | 2,480 | 1,465 |

Crushed with Grain.

| | | | |
|----------------------------|-------|-------|-------|
| 1.364 x 1.368 x 1.351..... | 1.866 | 3,320 | 1,779 |
| 1.652 x 1.688 x 1.625..... | 2.788 | 4,380 | 1,571 |
| 1.04 x 1.041 x 1.012..... | 1.082 | 1,500 | 1,385 |

The foregoing crushing tests were made on approximate cubes, on which you will observe the micrometer dimensions are given, and were crushed between pieces of soft belt leather, so as to correct any departure from the parallel in the bearing faces.

The Scott-Wilson coke was much closer grained than the Connellsville, but not quite as uniform in texture, as there were more cracks running through it. When crushed it broke into layers with a sharper fracture than the Connellsville, which crushed into fine particles.

Based upon the above analyses and crushing tests, we have no doubt that such coke as represented by the Scott-Wilson samples will be found to successfully carry burden in either cupola or blast furnaces, and should give results quite up to the Connellsville coke.

It will be observed that its strength under load compares very favorably with the Connellsville coke, and that its chemical analysis also is of a favorable character.

An interesting gathering is taking place this week at the Pencoyd Iron Works, Pencoyd. All the engineers, general managers and auditors of the individual plants controlled by the American Bridge Company will meet with the principal general officers of the concern. Nearly 100 persons will be present at the meeting, which will take place during three successive days at the Pencoyd Club, for the purpose of studying details, interchanging ideas and visiting the Pencoyd plant.

MANUFACTURING.

Iron and Steel.

The Sharon Steel Company have found a 4-foot vein of coal under property which they have leased in Volant, Lawrence County, Pa. It is said that over 600 acres are underlined with coal.

The Sandwich Iron & Steel Company, at Sandwich, Ill., have signed the Amalgamated Association scale. This is a new concern, and they will roll iron and steel bars.

The Bessemer plant of the Republic Iron & Steel Company, at the Brown Bonnell Works, at Youngstown, is now in successful operation, turning out a large product. It is probable that a mill will be added at this plant to turn out sheet bars and perhaps other material.

We have already noted the fact in these columns that the National Steel Company recently made a shipment of 1000 tons of steel rails to New Zealand from their Ohio Works, at Youngstown. The rails were shipped in a special train of 40 cars, which were decorated with banners reading as follows: "From National Steel Company, made by Youngstown (Ohio) workmen." "One thousand tons of steel rails consigned to New Zealand." "Protection, prosperity and progress." The cars were decorated with portraits of McKinley and Roosevelt. The workmen have donated a flag which will be presented to the consignee in New Zealand.

At the meeting of the stockholders of the recently organized Sharon Steel Hoop Company, held at Sharon, Pa., on Thursday, October 11, the following officials were elected: Morris Bachman, president; T. Sherman Clark, vice-president; John R. Hastings, secretary, all of Pittsburgh; and A. N. Perkins of Sharon, treasurer. Ground has been broken for the new plant of this concern, and work will be pushed as fast as possible. The American Bridge Company have the contract for the buildings, and the main structure will be 380 x 120 feet. The Lloyd Booth Company of Youngstown will build the mills; Wm. Tod & Co., also of Youngstown, will furnish the engines, and the Sterling Steel Company of Barberton, Ohio, will furnish the boilers. The new plant will have excellent shipping facilities, having direct connections with four trunk lines. The product will be hoops, bands and cotton ties, and main offices will be in Sharon.

The old P. L. Kimberly rolling mill, at Sharon, which has been idle for some time and was taken over by the American Steel Hoop Company, is being torn down. It was for many years a very successful mill.

The 20 mills of the New Castle Tin Plate Works resumed Monday, October 15.

The National Steel Company and the Republic Iron & Steel Company have their furnaces at Sharon banked and will overhaul and improve the plants before starting up again.

The two plants of the American Sheet Steel Company, at Niles, Ohio, have been put in full operation in all departments.

The plant formerly operated by Cherry Valley Iron Company, at Leetonia, Ohio, but which was taken over by Republic Iron & Steel Company, is being dismantled. It was not the intention to operate this plant when it was purchased.

The two new Carrie furnaces being built by the Carnegie Steel Company, at Rankin, Pa., are fast nearing completion, and will probably be ready for blast by January 1.

The reduction in wages at the plant of the National Tube Company, at McKeesport, Pa., reported in the Pittsburgh papers, is simply a reduction to correspond with the concessions made to the other manufacturers by the Amalgamated Association.

The Howard Axle Works of the Carnegie Steel Company, at Howard, near Homestead, are now in full operation. The new process used in the making of axles, by which they are first forged and then hammered to the exact size, is said to be very successful, greatly increasing the output and at the same time reducing the cost.

The West End Rolling Mills & Chain Works, at Lebanon, Pa., have received notice from General Wood, Military Governor of Cuba, that they have been awarded a contract for a large amount of heavy chain for shipment to Cuba. The contract includes all the chain needed for the equipment of the Cuban and Porto Rican ports and harbors with chains to be used in fixing buoys and other markers of dangerous points in the harbor and channel waters. The United States Government, which is spending much money in cleaning and renovating the ports and harbors, is furnishing the harbors with an ample equipment of buoys and other fittings, which will necessitate a large amount of chain. It will take from three to four months to complete the contract and will require an enlargement of the works to a considerable extent.

M. A. Hanna & Co., Cleveland, Ohio, advise us that they are shutting down Franklin Furnace, at Clinton, N. Y., which is near Utica, and will throw out of employment about 275 men. Like many others, this concern are shutting down as a matter of prudence, having enough iron on the bank to take care of

orders, and not caring to go ahead until they know more about what the future conditions are going to be.

The plant of the Monongahela Iron & Steel Company, at Hays Station, near Pittsburgh, is now in full operation in all departments. The product of this mill is high grade muck bar for special purposes.

The Star Works of the American Tin Plate Company in the Pittsburgh district, have not as yet been put in operation. The plant, however, has not been abandoned as reported, but will be started up when orders justify.

Hannah Furnace, at Youngstown, and Haselton Furnace, at Haselton, Ohio, both belonging to Republic Iron & Steel Company, and which have been undergoing extensive repairs for some time, will likely be blown in this month. The metal made by the two furnaces will be used in the new Bessemer plant of the Republic Iron & Steel Company at the Brown-Bon-nell Works, in Youngstown.

The 10-inch department of the Warren plant of the American Steel Hoop Company, at Warren, Ohio, which has been idle for some months, has been started up and the entire plant is now in full operation.

A movement is under way to establish at Youngstown, Ohio, a new mill for rolling iron and steel bars, and probably sheets. The matter has not yet taken definite form, and it is not known positively what the plant will be built. L. E. Cochran, for some years president of the Andrews Brothers Company, with mills at Hazleton, which were taken over by Republic Iron & Steel Company, is mentioned as being connected with the proposed new enterprise.

The wages of employees of the Union Works of the American Steel Hoop Company, in Youngstown, Ohio, not members of the Amalgamated Association, have been reduced to correspond to reductions made in the Amalgamated Association scale. The reduction averages about 12½ per cent.

At a meeting of the creditors of the Continental Iron Company, held in Warren, Ohio, October 15, James A. Campbell, at present district manager of Republic Iron & Steel Company at Youngstown, was elected trustee, and an Advisory Committee, consisting of James M. Bailey of Clinton Iron & Steel Company of Pittsburgh, Mason Evans of Youngstown and J. D. Shields of Niles, was appointed. Nothing was decided upon as to the proposed operation of the mills of the Continental Iron Company in Niles, Ohio, and Wheatland, Pa.

The Wilkes Rolling Mill Company, at Sharon, Pa., makers of muck bar and steel sheets, signed the Amalgamated Association scale, and their puddling department and muck mills are now running. The concern have large orders on hand and expect to be busy for several months.

The rod mill of the Oliver Works of the American Steel & Wire Company on the South Side, Pittsburgh, has been started up, after being idle some months.

The citizens of Zanesville are considering a proposition made by Charles H. Twist, Harvey K. Flagler and other Eastern capitalists for the erection in that place of a tube mill to have a capacity of 100 tons daily. It is proposed to organize a company with a capital stock of \$100,000 of preferred cumulative 6 per cent. stock and \$900,000 of common stock. Bonds to the amount of \$200,000 to be issued and sold at par, the money to go into the treasury of the company. The people of Zanesville to take half of the bonds and the remaining half to be disposed of in Boston by Messrs. Twist and Flagler. The plant to cost \$100,000 and the balance to be used in operations.

Machinery.

The Acme Machinery Works, Incorporated, have been organized at Goldsboro, N. C., with a capital of \$200,000. The concern will manufacture and repair machinery and do a general foundry business. The officials are J. J. Street, president and general manager; J. A. Street, vice-president, and W. E. Street, secretary and treasurer. The concern have installed a 125 horse-power boiler.

The Erie City Iron Works, Erie, Pa., manufacturers of steam engines and boilers, sustained a large loss by fire recently. The fire was confined to the "D" shops and arrangements for rebuilding will be made at once.

The Chattanooga Pipe & Foundry Company, Chattanooga, Tenn., who commenced to manufacture May 15, have had an abundance of orders right along. Capacity of the works is 60 tons of pipe and fittings per day. Prices commanded are satisfactory. The company have four traveling men on the road, who sell their goods and those of the Casey & Hedges Boiler Company. M. M. Hedges has charge of the pipe factory and James F. Casey the boiler department, both concerns being independent of each other in manufactured product.

The Casey & Hedges Boiler Mfg. Company, Chattanooga, Tenn., are making a full line of tubular boilers and several styles of the water tube type. They have for a year past had a phenomenal demand for their boilers and are now operating their plant full time.

The Ross-Meehan Foundry Company, Chattanooga, Tenn., have just erected a pattern shop at a cost of \$3500.

As a result of their exhibit at the Paris Exposition of presses, dies, shears, drop hammers and other tools for working sheet

metals, the E. W. Bliss Company, Brooklyn, N. Y., have received a large number of important orders for their tools. They advise us that their new plant, equipped in the most up to date manner, is about completed. A large electric light and power plant is to be installed. Each floor will have a separate motor for driving the main shafts, while all of the larger machines will be driven by independent motors. Work on their new foundry, 200 x 130 feet, is also well under way.

The Wagner Electric Mfg. Company, St. Louis, have closed a contract with the Lachine Rapids Hydraulic & Land Company of Montreal for 15 transformers, 250 kw. each, for power transmission, voltage ratios from 8000 to 2000 up and down. Five of these transformers are to be delivered promptly. This company is working overtime and is busily engaged on the usual run of smaller work.

It is reported that the old established machine shop of the late F. S. Perkins, Lowell, Mass., is soon to be sold at auction by the administrators of the estate. This shop is equipped for manufacturing lathes and other machinists' tools, and has been in successful operation for over 30 years. It employs about 75 hands when running full.

Last week we referred in these columns to the organization of the Pittsburgh Valve, Foundry & Construction Company of Pittsburgh, who have been organized in that city, with a capital of \$1,150,000. The new concern have secured a suite of offices on the fifth floor of the Empire Building, Fifth and Liberty streets, Pittsburgh, and are expected to start in business November 1. The new company will be large manufacturers of heavy pipe fittings, and construction of rolling mills, blast furnace and manufacturing plants in general. The officials and directors of the new company have already been given.

The International Power Company, operating the Rhode Island Locomotive Works, Providence, R. I., have just completed an order for five ten-wheeled passenger locomotives for the Plant system of railways, and also an order for the same system for six ten-wheeled freight locomotives. The company are continually increasing their business and employ at the present time more men than ever before.

Parties from Erie, Pa., are said to be likely to build a foundry at South Sharon. It will be a large plant.

The Moline Pattern & Mfg. Company have succeeded to the Moline Pattern & Machine Works at Moline, Ill. The president and manager of the new company is David A. Gamble; vice-president, D. L. Adams; secretary and treasurer, Geo. B. Buck. The company are manufacturers of patterns and novelty work. They manufacture the Hoy churn and the Shortliff rotary engine.

The Hibben-Hill Boiler Works, South Chicago, were destroyed by a fire on the 10th inst., which also did considerable damage to adjoining properties.

The La Crosse Packer's Package Company is to be the name of the new manufacturing enterprise at La Crosse, Wis., to which some attention was recently given in these columns. They will make tin lard pails, including their own lithographing, and will also build machines for making metal packages.

The Wm. Bayley & Sons Company, Milwaukee, Wis., will immediately rebuild the portions of their plant which were recently destroyed by fire. The part of the works damaged consisted principally of the machine shop. The foundry and the office were uninjured. The preservation of the office will assist greatly in resuming active operations, as the drawings of work to be done or partly completed are thus available. The company are manufacturers of architectural work as well as general machinery, and are also extensive manufacturers of hot blast heating apparatus.

The Fox Machine Company, Grand Rapids, Mich., who are manufacturers of machine tools, wood trimmers and steel sash pulleys, are enjoying an encouraging increase in their business. They had been running eight hours per day from July 1, but on October 1 started up with ten hours. Orders are coming in much better than they had expected, in view of the presidential campaign. They look for a splendid trade during the remaining fall and coming spring months if the result of the election is favorable to business interests.

Somers, Fittler & Clark, Limited, of Pittsburgh have sold to the Oliver Iron & Steel Company of that city two 100 horse-power and one 80 horse-power Otto gas engines.

McDowell & Co., Schmidt Building, Pittsburgh, dealers in engines and second-hand machinery, have purchased the old Allegheny tannery in Allegheny, and will make some alterations to the buildings and use it as a warehouse for the storing of engines and other material which they handle. Their present buildings and yards have become entirely too small to handle their rapidly growing business, and the securing of larger quarters was imperative.

The Blakeslee Mfg. Company, Birmingham, Ala., are making a shipment of six carloads of veneer dryers to Poplar Bluff, Mo., also three carloads of veneer machinery to Cairo, Ill.

After manufacturing pumping machinery for 20 years under the name of the Dow Steam Pump Works, San Francisco, the firm's facilities have been taxed to such an extent that larger quarters were found necessary to meet their rapidly increasing demands, and to modernize plant and methods of construction.

To this end their incorporation is announced under the name of the Geo. E. Dow Pumping Engine Company, with offices at 179 First street. The new works contain upward of 50,000 square feet of floor surface, and are being equipped with a thoroughly modern outfit of tools for the manufacture of high grade pumping machinery in all its branches.

The Pierce-Crouch Engine Company of New Brighton, Pa., builders of the Brighton gas engine, have recently sold gas engines through their Pittsburgh office as follows: Standard Horse Nail Company, New Brighton, 60 horse-power engine; Spears & Riddle, Wheeling, W. Va., 25 horse-power engine; W. H. Fuller, Pittsburgh, 25 horse-power engine; Highland Presbyterian Church, Pittsburgh, 6 horse-power; T. A. Westmyer, Wheeling, W. Va., 2 horse-power; Fountain Inn, New Castle, Pa., 5 horse-power.

The Totten & Hogg Iron & Steel Foundry Company of Pittsburgh, builders of rolls, rolling mill machinery and engines, are installing in their works a 25-ton electric travelling crane, made by the case Mfg. Company of Columbus, Ohio.

The Columbus Pneumatic Tool Company of Columbus have been incorporated by M. S. Dunlop, T. C. Dunlop, F. H. Plum, F. S. Morris and A. M. Steinfeld. They will manufacture pneumatic tools and will make a specialty of the U. & W. piston air drill for mining and general engineering and metal work. Patents on this tool have recently been granted to T. C. and S. M. Dunlop.

The Ideal Foundry Company of Girard, Pa., are seeking a location in Youngstown, Ohio, for the erection of a new plant.

The O. S. Kelly Company of Springfield, Ohio, last week made a large shipment of road rollers to the Hawaiian Islands. They have just received orders for ten carloads of traction engines and cars from Mexico. The company have recently increased their force and are finding it difficult to keep up with orders.

The Morgan Engineering Company of Alliance, Ohio, are experiencing an unprecedented foreign demand for large cranes. A very large crane was shipped last week to France. Another will go to Copenhagen, Denmark, within a few days. Two were recently shipped to Cuba and another goes to Japan. A very large order has just been received from Montana. A stationary overhead crane having ten hoists, to be used in placing motors in automobiles, is nearly completed for a New York concern. It is said that in event of the re-election of McKinley the company have decided to place contracts for the erection of a large new crane shop.

Hardware.

The Chicago Hardware Mfg. Company, North Chicago, Ill., have found their business increasing to such an extent that it is necessary to add another building to their plant. It will be built of brick, three stories in height, and will cover a ground space 40 x 75 feet. It will be used by the company as a finishing department and will thus give them more space for work in other departments. An addition to the foundry is also contemplated.

The Ornamental Iron & Wire Company, Chattanooga, Tenn., have removed their plant from Montgomery avenue to the building 302 and 303 Carter street, where they have made additions to their machinery which enable them to double their capacity. They advise us that they have been overcrowded with orders for some time. The company have just shipped an iron fence to the County Commissioners of Arcadia, Fla., for the Court House there; also completed iron fences to surround the State College at Columbus, Miss., and the Court House at Indianola, Miss. They have also received contract for iron fence for the city cemetery at Bell Buckle, Tenn. Of work in their other lines that may be mentioned they have just finished brass bank railings for the bank at Crossville, Tenn., as well as one at Holly Springs, Miss., and have recently erected a number of fire escapes for the new Stanton House, Chattanooga. Further, they have put up two large iron stairways in the new Court House at Cookeville, Tenn., and are completing a contract for a large number of iron and wire window guards of the asylum at Terrell, Texas.

George P. Clark, Windsor Locks, Conn., manufacturer of hand trucks, is building an addition to his factory, 96 x 32 feet, three stories high.

The Charles Parker Company, Meriden, Conn., manufacturers of the well-known Parker vise, advise us that 206 out of a total of 207 vises required by the United States Government for the Rock Island Arsenal were specified as Parker's.

The D. M. Steward Mfg. Company, Chattanooga, Tenn., report a constantly increasing demand for their crayons and pencils from all parts of the world. Colonel Steward has just returned from a four months' European trip, during which he visited the leading business centers of different countries with which the company have had an established trade for some years, and made important contracts with new connections. They advise us that their sales of pencils during 1898 and 1899 aggregated 50,000,000 pencils, while sales for the present year are maintaining this ratio. Of individual sales reference is made to a Paris house, who began four years ago purchasing in 1000-gross lots and have increased their orders to 10,000-gross lots, and who expect

shortly to give a standing monthly order for that quantity. It is also stated that the Steward electric insulators, which the company manufacture, are now having a considerable demand in Europe, along with their gas burners and lava tips.

Hoopjes & Townsend Company, Philadelphia, have bought a tract of land near Fort Washington, which is about 14 miles from Philadelphia on the Trenton cut off of the Pennsylvania Railroad and the Northern Pennsylvania Railroad, connected with the Reading system, on which they are intending to erect a rolling mill. The company advise us, however, that they have not decided to remove their plant to that point.

Miscellaneous.

The Vulcan Iron Works, Des Moines, Iowa, are building a two-story brick foundry and machine shop, to occupy 44 x 130 feet, ground space.

Kokomo Brass & Iron Company have been incorporated at Kokomo, Ind., with a capital stock of \$100,000, to operate a brass and iron foundry. The company have purchased the plant of the Gruschow Mfg. Company of Kokomo, and will enlarge it considerably. The brass plant of the company will occupy a two-story brick building, 50 x 80 feet in size, and will have a capacity of about 2000 car brasses a day. The iron foundry will have a capacity of about 15 tons of castings a day, and will occupy a wooden building 131 x 40 feet in size. It will be equipped with a Whiting cupola and other modern appliances. The officers of the company are E. T. Hitchcock of Chicago, president; T. J. Nerny, secretary and treasurer, and F. C. Peck, vice-president. The output of the company will be almost entirely railroad work, including car brasses and brake shoes.

The stockholders of the Allegheny Heating Company, Allegheny, Pa., suppliers of natural gas, have re-elected the following Board of Directors: James H. Reed, Joshua Rhodes, James D. Callery, T. H. Given, M. K. McMullin, J. C. McDowell, William F. Lloyd, Herbert Dupuy, R. S. Smith, James T. Arnold and George W. Crawford.

The Monongahela River Consolidated Coal & Coke Company have bought 121 acres from one party and 95 acres from another of coal lands in the Elizabeth township district.

The Harbison & Walker Company of Pittsburgh, manufacturers of high grade fire clay brick, will apply for a revision of their charter, so as to admit of their mining and selling coal.

At Pittsburgh last week, deeds were placed on record transferring to the Pittsburgh Stove & Range Company of that city a number of stove plants taken over when that concern were organized. The properties transferred are: Walters Stove Company, Sharpsburg, 146 x 191 feet on Cecil Alley, for \$15,000; Anshutz, Bradberry & Co., 196 x 521 feet on Preble avenue, Ninth Ward, Allegheny, for \$89,275; Frank S. Bissell, 120 x 346 feet on Robinson street, First Ward, Allegheny, for \$67,600; De Haven & Co., Limited, 288 x 325 feet on Preble avenue, Sixth Ward, Allegheny, for \$50,000; Crea, Graham & Co., 120 x 266 feet on Rebecca street, Fifth Ward, Allegheny, for \$35,900.

The Archer Iron Works have been incorporated at Chicago by James O'Donnell, William G. Klemp and Charles C. Arnold to manufacture iron, steel and wood products.

The Reuter Dahl Electric Company of 23 Weybosset street, Providence, R. I., a corporation under Maine laws with an authorized capital stock of \$100,000, are a new industry which will manufacture batteries. The officers of the company are Arvid Reuter Dahl, president; George F. Weston, treasurer; Leonard H. Campbell, secretary. The Board of Directors is made up of the officers.

R. R. Quay and others have applied for a charter for the Laurence Heat, Light & Power Company, at New Castle, Pa. They will be an ally of the New Castle Traction Company and Electric Company.

The Pioneer Brass Works, Indianapolis, Ind., are erecting a two story brick building.

The D. & W. Fuse Company, who started in business manufacturing fuses at 53 Aborn street, Providence, R. I., about two years ago, have, owing to the growth of their business, been forced to move to 407 Pine street, where they occupy three floors. The fuse manufactured by the company makes no flash or noise.

The Milwaukee Woven Wire Works, Milwaukee, Wis., have been incorporated, with a capital stock of \$25,000, by Charles Kemkel, F. C. Niemann and Henry Kelling.

In the United States Circuit Court in Pittsburgh August Buerkel and the Monarch Water Heater Company have filed a bill in equity against the Standard Heater Company, charging an infringement on a patent for a design of a case or shell for water heaters.

The Sharon Coal & Limestone Company of Sharon, Pa., will make application for a charter on November 12. Among the incorporators are Frank H. Buhl, John Stevenson, James P. Whitla, all of Sharon, Pa., and Geo. W. Darr of Pittsburgh. The company own extensive coal and limestone lands in Mercer and Lawrence counties, and will be an identified interest of the Sharon Steel Company.

The Iron and Metal Trades.

Generally speaking, the markets are quiet, a fact which is quite universally attributed to the desire on the part of buyers to await developments in the presidential election. In ordinary years this is the period in which a determined struggle is made for winter work for the rolling mills. While that has been secured in some branches, as in the Bar trades, where the prices were sharply cut, it is not on the order books in other departments. By the middle of November it will be clear whether the volume of orders held back by buyers and distributors will be great enough to comfortably fill the big plants and give the little mills a good tonnage in addition. Naturally the great organizations are securing the bulk of the business, much of it through long time contracts with manufacturing consumers and allied interests. They all follow the axiom that running to full capacity is the first consideration.

Pittsburgh reports a somewhat firmer tone in the Pig Iron market, although the volume of transactions is so light that the slightest pressure to market product might turn the scale. In the East the largest transaction appears to have been a sale of 4000 tons of Basic Pig to an Eastern Pennsylvania mill at \$14, delivered.

Steel Billets are nominal all over the country. It is noticeable that the price of Open Hearth Billets is more and more approaching that of Bessemer Billets, a natural result of the greatly increased capacity for Siemens Steel.

In the Steel Rail trade the announcement has been made that the Pennsylvania Railroad has decided to buy 150,000 tons for next year's delivery. So far as we can learn, however, the allotment of even a part of the work has not yet been made to the individual mills. To the outside observer it seems difficult to understand why the roads should be in a hurry to place their orders now for distant deliveries.

In the Plate trade a slightly easier tone is noted. Chicago reports a sale of about 2000 tons of Universal Plates to a local firm of merchants.

In Structural Steel it is understood that the leading interest has contracts in such abundance that capacity is engaged for many months to come. The capture of the East River Bridge work by the Pennsylvania Steel Company involves about 20,000 tons of material, of which a considerable part will go to Pittsburgh. It is likely that at an early date there may be some notable contracts for foreign delivery.

Reports from the principal makers of Bars and Hoops agree in reporting a very active business, and sellers are inclined to be cautious about further commitments at present prices. It was believed that there might be some trouble in supplying the union mills, when starting, with the necessary specifications, in spite of accumulated orders. It is developing, however, that new business is coming along in an unexpectedly liberal manner.

The Cast Iron Pipe trade in the East is very quiet, and competition between the consolidation and the outside shops is very keen. Chicago reports the sale of an 8000-ton lot to a railroad company.

Relatively little new business is being taken for export, but the large concerns are more and more preparing for this branch as a permanent feature of their work.

In the metal trade Tin has shown the only change, and that in downward direction. In Kansas the Cherokee-Lanyon Company have closed down indefinitely four Coal furnaces at Pittsburg, but will build two additional blocks at Iola, thus illustrating once more the shifting from the old centers to the gas belt.

A Comparison of Prices.

At date, one week, one month and one year previous.

Advances Over the Previous Month in Heavy Type. Declines in Italics.

| | Oct. 17, 1900. | Oct. 10, 1900. | Sept. 19, 1900. | Oct. 18, 1899. |
|--|----------------|----------------|-----------------|----------------|
| PIG IRON: | | | | |
| Foundry Pig, No. 2, Standard, Philadelphia | \$15.00 | \$15.00 | \$15.50 | \$22.75 |
| Foundry Pig, No. 2, Southern, Cincinnati | 13.00 | 13.00 | 13.75 | 20.75 |
| Foundry Pig, No. 2, Local, Chicago | 14.50 | 14.50 | 15.00 | 23.00 |
| Bessemer Pig, Pittsburgh | 13.25 | 13.00 | 14.00 | 24.50 |
| Gray Forge, Pittsburgh | 12.50 | 12.75 | 13.00 | 20.50 |
| Lake Superior Charcoal, Chicago | 18.00 | 18.00 | 18.50 | 25.00 |
| BILLETS, RAILS, ETC.: | | | | |
| Steel Billets, Pittsburgh | 16.50 | 16.25 | 16.75 | 39.00 |
| Steel Billets, Philadelphia | 19.50 | 19.25 | 19.25 | 40.00 |
| Steel Billets, Chicago | 19.50 | 19.50 | | |
| Wire Rods, Pittsburgh | 33.00 | 33.00 | 33.00 | 48.00 |
| Steel Rails, Heavy, Eastern Mill | 26.00 | 26.00 | 30.00 | 35.00 |
| Spikes, Tidewater | 1.45 | 1.40 | 1.50 | 2.05 |
| Splice Bars, Tidewater | 1.35 | 1.25 | 1.35 | 2.25 |
| OLD MATERIAL: | | | | |
| O. Steel Rails, Chicago | 10.50 | 10.00 | 9.50 | 20.00 |
| O. Steel Rails, Philadelphia | 13.75 | 12.75 | 12.75 | 21.50 |
| O. Iron Rails, Chicago | 16.00 | 15.50 | 12.50 | |
| O. Iron Rails, Philadelphia | 15.50 | 15.50 | 15.50 | 25.00 |
| O. Car Wheels, Chicago | 16.50 | 17.00 | 15.00 | 20.00 |
| O. Car Wheels, Philadelphia | 15.50 | 15.50 | 16.00 | 21.00 |
| Heavy Steel Scrap, Chicago | 10.00 | 10.00 | 9.00 | 17.00 |
| FINISHED IRON AND STEEL: | | | | |
| Refined Iron Bars, Philadelphia | 1.25 | 1.25 | 1.25 | 2.10 |
| Common Iron Bars, Youngstown | 1.20 | 1.25 | 1.25 | 2.25 |
| Steel Bars, Tidewater | 1.20 | 1.25 | 1.20 | 2.40 |
| Steel Bars, Pittsburgh | 1.10 | 1.10 | 1.15 | 2.35 |
| Tank Plates, Tidewater | 1.20 | 1.25 | 1.25 | 3.00 |
| Tank Plates, Pittsburgh | 1.05 | 1.10 | 1.10 | 2.75 |
| Beams, Tidewater | 1.65 | 1.65 | 1.65 | 2.40 |
| Beams, Pittsburgh | 1.50 | 1.50 | 1.50 | 2.25 |
| Angles, Tidewater | 1.55 | 1.55 | 1.55 | 2.40 |
| Angles, Pittsburgh | 1.40 | 1.40 | 1.40 | 2.25 |
| Skelp Grooved Iron, Pittsburgh | 1.40 | 1.40 | 1.40 | 2.10 |
| Skelp, Sheared Iron, Pittsburgh | 1.45 | 1.45 | 1.50 | 2.40 |
| Sheets, No. 27, Chicago | 3.05 | 3.05 | 3.05 | 3.15 |
| Sheets, No. 27, Pittsburgh | 2.80 | 2.80 | 2.85 | 3.10 |
| Barb Wire, f.o.b. Pittsburgh | 2.80 | 2.80 | 2.80 | 3.55 |
| Wire Nails, f.o.b. Pittsburgh | 2.20 | 2.20 | 2.20 | 2.95 |
| Cut Nails, Mill | 1.95 | 1.95 | 1.95 | 2.50 |
| METALS: | | | | |
| Copper, New York | 16.75 | 16.75 | 16.75 | 18.00 |
| Spelter, St. Louis | 4.40 | 3.95 | 3.95 | 5.20 |
| Lead, New York | 4.37½ | 4.37½ | 4.37½ | 4.00 |
| Lead, St. Louis | 4.42½ | 4.27½ | 4.32½ | 4.50 |
| Tin, New York | 27.95 | 28.75 | 28.00 | 30.50 |
| Antimony, Hallett, New York | 9.50 | 9.50 | 9.50 | 9.75 |
| Nickel, New York | 55.00 | 55.00 | 55.00 | 36.00 |
| Tin Plate, Domestic Bessemer, 100 lbs., New York | 4.19 | 4.18 | 4.84 | 4.82½ |

Philadelphia.

Office of The Iron Age, Forrest Building, 1
PHILADELPHIA, PA., October 16, 1900.

Business in this vicinity is in a state of hopeful expectancy based upon the apparent certainty of McKinley's election. It is true that actual buying is not in evidence to any great extent, but they say "it's a comin'." In regard to this, however, there is room for hesitancy, because of the fact that words and actions do not harmonize to the extent that could be desired. There is no doubt that the election of Bryan would be disastrous in a business point of view, but it must be remembered that the election of McKinley will merely perpetuate the conditions of the past four years. It brings in no new elements, but it does prevent the introduction of adverse conditions. From a strictly business point of view therefore, the election may be regarded as an accomplished fact, and the conditions the same as they would have been had there been no election at all. The lease has been renewed on favorable terms, but beyond that there is no reason for figuring on any material change from present conditions. Buying during the week has not been heavy, prices are just a shade easier, and with steadily increasing supplies prospects for better prices cannot be regarded with much confidence. A larger volume of business may naturally be looked for after the election, as a great many orders are being held back until that question is definitely settled. Many of these orders will have to be placed anyhow, as yards are bare of stock, and replenishments are an absolute necessity, but if prices are advanced it is doubtful if buyers will make a satisfactory response. They would probably continue as at present feeling their way cautiously along, but heavy buying at advanced figures is not a safe theory to work on under present conditions.

Pig Iron.—The market is in much the same condition as noted a week ago. Orders are mostly for small lots, quick delivery, although once in a while a several thousand ton order is entered, but in such cases prices are very low. The whole market, in fact, is simply waiting for something to give it a turn, but in which direction the turn will be is a matter of opinion. Some think that with McKinley's election prices will be better, others think that with increasing stocks and winter coming

on we are more likely to see lower prices before the year is out, particularly as next year's costs are likely to be considerably less than they are to-day, in anticipation of which there will be a general disposition to discount prices for long deliveries. No important change is expected at present, however, although the tendency toward easier rates will be very likely to continue until next month, if not beyond that. There is no reason to complain of any serious dullness among Iron consumers at present, although there has been a perceptible falling off during the past three or four weeks, but there is enough work in hand to keep the shops busy for some time to come, and it is hoped that next month will bring in a satisfactory amount of renewals. As a matter of fact, there is a great deal of confidence in regard to the final outcome, but temporarily things are quiet, and prices all the way through are inclined to shade off a little. Prices on Pig Iron are difficult to quote, the range being as wide as at any time during the year, but as a rule the extreme limits for Philadelphia or nearby deliveries would be about as follows: No. 1 X Foundry, \$16 to \$17; No. 2 X Foundry, \$15 to \$15.75; No. 2 Plain, \$14.25 to \$14.75; Standard Gray Forge, \$13.25 to \$14; Ordinary Gray Forge, \$12 to \$13; Basic, \$14 to \$14.25; Low Phosphorous, nominal, \$23 to 24.

Billets.—Market quiet, prices about the same as last week, but very few sales reported. Bessemer, nominal, at \$20; Open Hearth, \$20.50 to \$21.50.

Plates.—Orders have been rather small during the past week, and prices not fully maintained. There is a good business in prospect, however, as one of the ship-building yards is expected to be in the market for several thousand tons in course of a few days, besides other lots of considerable importance. There is also some business being done for export, but special rates have to be made to secure business of this character. Prices are usually quoted at 1.25c. to 1.30c., delivered at nearby points, but on desirable orders 5c. to 10c. less is said to have been accepted. The market is a little irregular, however, and prices depend to a great extent on the circumstances in each particular case. Prices for city or nearby deliveries are about as follows: 1/4-inch and thicker, 1.25c. to 1.30c.; Universals, 1.30c. to 1.35c.; Shell, 1.35c. to 1.40c.; Flange, 1.50c. to 1.55c.; Charcoal Iron Plates, C. H. No. 1, 2.25c.; Best Flange, 2.75c.; Fire Box, 3.25c.

Structural Material.—The demand for small and medium sizes is very good, the aggregate amount entered during the week being of large proportions. The mills are extremely busy, and prospects are in all respects satisfactory. Prices very firm, and on some sizes they are dearer, but general quotations are unchanged as follows: Angles, 3 inches and upward, 1.65c. to 1.75c.; less than 3 inches, 1.30c. to 1.40c.; Beams and Channels, 15-inch and upward, 1.65c. to 1.75c.

Bars.—The demand is excellent, and mills appear to be all crowded with work. Prompt deliveries are hard to get, and although production has been greatly increased, it is difficult to catch up with the demand. Prices are firm, and in some cases 1.30c., at nearby mills, is said to be an inside figure, although 1.25c. and a shade less has been accepted in some cases. A good deal depends on specification, however, and 1.30c. to 1.35c., at seaboard or nearby points, is a fair average quotation, and 1.25c. to 1.30c. for Steel Bars.

Sheets.—There is a good demand for all descriptions, but especially for the high numbers, for which there is considerable pressure for prompt deliveries. Prices firm as follows for best Sheets (common Sheets two-tenths less): No. 10, 2.25c.; No. 14, 2.35c.; No. 16, 2.56c.; Nos. 18-20, 3c.; Nos. 21-24, 3.10c.; Nos. 26, 27, 3.20c.; No. 28, 3.30c.

Old Material.—The market for Old Material is improving, Steel being specially strong with sales as high as \$13.50 for Heavy Melting stock, and \$16.25 to \$16.50 for Low Phosphorous. Other descriptions are firmer, but not quotably higher. Bids and offers are about as follows for deliveries in buyers' yards: Choice Railroad Scrap, \$14.50 to \$15.50; No. 1 Yard Scrap, \$12 to \$13; No. 2 Light Scrap, \$10.50 to 11; Machinery Cast, \$13.50 to \$14.50; Heavy Steel Scrap, \$13 to \$13.50; Old Iron Rails, \$15.50 to \$16.50; Old Steel Rails, \$13.75 to \$14.25; Wrought Turnings, \$8.50 to \$9; Cast Borings, \$6.75 to \$7; Old Car Wheels, \$15.50 to \$16.50; Iron Axles, \$15 to \$16; Steel Axles, \$15 to \$16.

E. B. Leaf has withdrawn from the firm of Potts, Leaf & Wittman of Philadelphia, and will continue in the Iron and Steel business at Room 820, Real Estate Trust Building, under the name of E. B. Leaf & Co.

Hatfield & Hilles have removed their offices from the Fidelity Building to the more convenient location in the Real Estate Trust Building, Broad and Chestnut streets, and will occupy Rooms 1319-20 and 21.

Chicago. (By Telegraph.)

Office of The Iron Age, 1205 Fisher Building, CHICAGO, October 17, 1900.

A very heavy tonnage, according to the testimony of trade in general, is awaiting the result of the election. Some take an exceedingly sanguine view of probabilities, of course, of business, in case the outcome is satisfactory to manufacturing and commercial interests. They believe that the heavy buying then precipitated will advance prices. They may be too optimistic, but it is certainly reasonable to suppose that a general buying movement, such as may be expected, will at least cause those who are now disposed to make concessions in prices to exhibit some firmness. This in itself would be an advance. The past week has shown some increase in the inclination of certain consuming interests to anticipate their requirements without regard to the election. Money is easy throughout the West, and those who have confidence in the political outcome feel that they are making no mistake in taking advantage of current prices, which are far below those prevailing at the opening of the year; the Wire trade is heavy, showing an almost daily increase in orders now being booked. The Hardware business also continues very active, despite the fact that merchants are almost entirely confining their purchases to meet the pressing requirements of their customers.

Pig Iron.—The tonnage booked during the week has again been heavy. The Malleable interests are reported to have been the largest buyers, but although good orders were taken on their account a great deal more business of the same character is pending. The demand from the general foundry trade is keeping up well, and orders for 1000 tons or more have been coming out encouragingly. The Northern furnace companies have been the best favored in the business of the week, but no complaint of lack of trade is heard from any of the sales agents, even from those who handle Southern Iron exclusively. More buying is noted for deliveries running into next year, but the influence of the political campaign is strongly shown by the efforts of some buyers to get 30-day options at present prices, which will carry them over the election. Quotations are as follows:

| | |
|---|--------------------|
| Lake Superior Charcoal..... | \$18.00 to \$18.50 |
| Local Coke Foundry, No. 1..... | 15.00 to 15.50 |
| Local Coke Foundry, No. 2..... | 14.50 to 15.00 |
| Local Coke Foundry, No. 3..... | 14.00 to 14.50 |
| Local Scotch, No. 1..... | 15.00 to 16.00 |
| Ohio Strong Softeners, No. 1..... | 16.00 to 16.50 |
| Southern Silvery, according to Silicon.. | 15.50 to 16.50 |
| Southern Coke, No. 1..... | 15.00 to 15.35 |
| Southern Coke, No. 2..... | 14.00 to 14.35 |
| Southern Coke, No. 3..... | 13.50 to 14.10 |
| Southern Coke, No. 1 Soft..... | 15.00 to 15.35 |
| Southern Coke, No. 2 Soft..... | 14.00 to 14.35 |
| Foundry Forge..... | 12.75 to 13.50 |
| Gray Forge and Mottled..... | 12.25 to 12.50 |
| Southern Charcoal Softeners, according to Silicon..... | 15.50 to 17.50 |
| Alabama and Georgia Car Wheel..... | 20.85 to 21.85 |
| Malleable Bessemer..... | 14.50 to 15.00 |
| Standard Bessemer..... | 14.50 to 15.00 |
| Jackson County and Kentucky Silvery, 8 per cent. Silicon..... | 18.00 to 19.00 |

Bars.—The larger manufacturers of Bar Iron state that the demand is broadening quite considerably. They are making a new high water mark in their daily business every two or three days. The encouraging condition of the trade is shown by the fact that when the Republic Iron & Steel Company prepared to reopen their mills they expected to have some difficulty in securing enough business to make a creditable start. They were about to do this, however, without disturbing the market, and they find orders enough steadily coming forward to warrant the starting of additional mills every two or three days. Some large inquiries are in the market, notably from implement manufacturers, who had covered for only a fraction of their requirements. The demand is excellent from car building works, but in fact very few consuming interests are not represented among orders now being booked. A great deal of business is being deferred until after the election, and it is then expected that an extremely active trade will be experienced. Mill shipments are quoted at 1.35c. to 1.40c., Chicago, for Common Iron, 1.30c. to 1.40c. for Soft Steel Bars, and 1.45c., base, Chicago, for Hoops. Jobbers are enjoying a large demand, carload orders for immediate shipment being frequent. The demand is urgent from wagon and carriage builders, but other manufacturing consumers are also buying freely. Store quotations are continued at 1.65c. to 1.75c. for Common Iron, and 1.50c. to 1.65c. for Steel, and 2c. to 2.25c. for Hoops.

Billets.—Local business is light, with quotations unchanged at \$19.50 to \$20 for ordinary 4 x 4 inch.

Structural Material.—Some building contracts are being obtained in outlying towns in this territory. They are usually for small amounts, but the aggregate received in

this way makes a good showing. The Chicago demand continues light in comparison with that from the country, but the prospects are steadily getting brighter for heavy business to be undertaken toward spring. Manufacturers of railroad supplies are good customers for Shapes and other specialties used by them. A contract for 2000 tons of Universal Plates was placed by a supply company during the week. Quotations, mill shipments, are as follows: Beams, Channels and Zees, 15 inches and under, 1.65c.; 18 inches and over, 1.75c.; Angles, 3 inches and over, 1.55c.; Angles, under 3 inches, 1.35c.; Tees, 1.70c.; Universal Plates, 1.35c. From local yards small lots of eBams and Channels quoted 2.15c. to 2.35c.; Angles, 1.80c. to 1.90c. rates, and Tees, 2c. to 2.20c.

Plates.—A surprisingly good demand is noted for Plates, in view of the political campaign. Some orders which would even be considered large under ordinary circumstances are now being placed. A few of these are subject to cancellation in case of an unfavorable result of the election, but most of the business is unconditional. Mill shipments are quoted at 1.25c. to 1.35c., Chicago, for Tank Plates, and 1.50c. to 1.60c. for Flange. Jobbers are selling Tank from store at 1.50c. to 1.60c., and Flange at 1.90c. to 2c.

Sheets.—Manufacturers find a persistent demand for small lots for immediate delivery, with a decided increase in inquiries for large lots. Trade would unquestionably be heavy but for the approaching election. The smallness of stocks among jobbers and also with manufacturing consumers is shown by the urgent appeals for prompt shipment as soon as orders are booked. Mill shipments of No. 27 Black Sheets continue to be quoted at 3.05c., Chicago, and Galvanized Sheets at 75 per cent. off. The local situation has improved perceptibly within the past few days, the disposition to make concessions to effect sales from stock having disappeared. Jobbers' prices are now very firm. Stocks are small, and the larger jobbers report a steady demand from the other houses to supply the current trade. Jobbers quote small lots from store at 3.10c. to 3.15c. for No. 27 Black; 2.10c. to 2.20c. for No. 16; 1.85c. to 2c. for Nos. 10 to 14, and 70 and 5 to 70 and 10 off for Galvanized.

Merchant Steel.—No large contracts are reported, but a good business is being done by manufacturers' agents in small lots. The leading makers of Merchant Steel are now so well supplied with work that very attractive orders do not induce them to shade prices. Mill shipments, Chicago delivery, are quoted as follows: Smooth Finished Machinery Steel, 1.75c. to 1.90c. Smooth Finished Tire, 1.75c. to 1.95c.; Open Hearth Spring Steel, 2.15c. to 2.40c.; Toe Calk, 2.40c. to 2.60c.; Sleigh Shoe, 1.70c. to 1.90c.; Cutter Shoe, 2.40c. to 2.60c. Ordinary grades of Crucible Tool Steel are quoted at 6c. to 7c., Specials 13c. upward.

Merchant Pipe.—An excellent demand is reported especially for small lots from stock. The pressure is quite heavy for closing up work in the heating trade, in which a great deal of Pipe is now being consumed. Manufacturers' prices, random lengths, are as follows:

| | In carloads. | Less than carloads. |
|--|--------------|---------------------|
| | Blk. Galvd. | Blk. Galvd. |
| 1½ to 1½ inch and 11 to 12 inches..... | 59.2 46.2 | 54.9 40.9 |
| ¾ to 10 inches..... | 66.7 53.3 | 61.9 48.9 |

Jobbers' prices on Boiler Tubes have been reduced, and are now quoted from store as follows:

| | Steel. | Iron. |
|--------------------------------|--------|-------|
| 1 to 2¼ inches, inclusive..... | 50 | 40 |
| 2½ inches..... | 50 | 42½ |
| 2¾ to 5 inches..... | 60 | 50 |

Cast Iron Pipe.—Manufacturers are having a very sharp demand from all classes of consumers for the delivery of small quantities during the continuance of Pipe laying weather. Municipalities and water and gas companies have deferred pressing work as long as possible, and are now urgent for needed material in this line before winter sets in. Some contracting is also being done, an order for 8000 tons from the Union Pacific Railroad having been booked during the week.

Coke.—Sales agents for Connellsville and West Virginia Coke report the continuance of heavy business. Foundrymen are using a larger quantity of Coke in melting than during the earlier months in the year. Quotations for 72-hour Foundry Coke are \$4.50 to \$5, Chicago.

Railroad and Track Supplies.—The Illinois Steel Company have shut down their South Chicago mill to await an accumulation of orders. The contracts now on their books are for future delivery, but it is expected that orders will soon come in to enable the mill to resume operations. The works need repairs, which in the natural course of things would require at least three weeks. The Rail mill has made a remarkable record, having run

about four years with practically no shut down with the exception of a short stoppage early last year, when some changes were made in the equipment. Very little business in Heavy Sections has been secured since our last report, but an exceedingly active demand has been enjoyed for Light Rails. A very good business is also noted in Track Fastenings. Standard Section Rails are quoted at \$26, and Light Rails at \$25 to \$28, according to weight. Track Supplies are quoted as follows: Splice Bars, 1.35c. to 1.40c.; Spikes, 1.70c. to 1.80c.; Bolts, with Hexagon Nuts, 2.10c. to 2.20c.; Square Nuts, 2c. to 2.10c.

Old Material.—Although transactions have been limited. Old Material originating with railroads is firmly held at somewhat higher prices. Lists now put out by railroad companies are very small, showing that they are holding back most of their accumulations. Buyers are, therefore, forced to advance their bids to secure what they either desire or must have. Low grade Scrap is neglected, and offerings are increasing. The following are approximate quotations per gross ton:

| | |
|-------------------------------------|--------------------|
| Old Iron Rails..... | \$16.00 to \$16.50 |
| Old Steel Rails, mixed lengths..... | 10.50 to 11.00 |
| Old Steel Rails, long lengths..... | 13.00 to 13.50 |
| Relaying Rails..... | 18.00 to 20.00 |
| Old Car Wheels..... | 16.50 to 17.00 |
| Heavy Melting Steel Scrap..... | 10.00 to 10.50 |
| Mixed Steel..... | 8.00 to 9.00 |
| Iron Fish Plates..... | 15.50 to 16.00 |
| Steel or mixed do..... | 11.50 to 12.00 |
| Iron Car Axles..... | 19.00 to 19.50 |
| Steel Car Axles..... | 15.50 to 16.00 |
| No. 1 Railroad Wrought..... | 14.50 to 15.00 |
| No. 2 Railroad Wrought..... | 12.50 to 13.00 |
| Shafting, Iron and Soft Steel..... | 17.00 to 17.50 |
| No. 1 Dealers' Wrought..... | 9.00 to 9.50 |
| No. 1 Mill..... | 7.50 to 8.00 |
| No. 2 Mill..... | 6.00 to 6.50 |
| No. 1 Busheling..... | 8.50 to 9.00 |
| No. 2 Busheling..... | 7.50 to 8.00 |
| Iron Car Axle Turnings..... | 9.00 to 9.50 |
| Soft Steel Axle Turnings..... | 8.00 to 8.50 |
| Machine Shop Turnings..... | 7.00 to 7.50 |
| Wrought Drillings..... | 6.00 to 6.50 |
| Cast Borings..... | 4.00 to 4.50 |
| Mixed Borings and Turnings..... | 4.50 to 5.00 |
| No. 1 Boilers, cut..... | 8.50 to 9.00 |
| Boiler and Ship Scrap..... | 8.00 to 8.50 |
| No. 1 Cast..... | 12.50 to 13.00 |
| No. 2 Cast..... | 8.50 to 9.00 |
| Railroad Malleable Cast..... | 12.00 to 12.50 |
| Agricultural Malleable Cast..... | 10.00 to 10.50 |

Metals.—Copper shows no change, Lake being held at 17c., and Casting brands at 16½c. The demand is steady, and the prices now ruling appear to be satisfactory to consuming interests. Pig Lead is in fair demand, manufacturers continuing to quote 4.32½c. for Desilverized and 4.42½c. for Corroding in 50-ton lots. A typographical error was made last week in printing 5-ton lots instead of 50-ton lots.

Pittsburgh.

Office of *The Iron Age*, Hamilton Building, 1
PITTSBURGH, October 17, 1900. (

(By Telegraph.)

Pig Iron.—The tone of the Bessemer Pig Iron market seems to be firmer and sales of small lots are being made on the basis of \$13.25 to \$13.50, Pittsburgh. No large lots have recently been sold. The belief exists that Bessemer Iron may take an upward move after the election. There is a fair demand for Forge Iron and there have been some sales, but at low prices. Foundry Iron is in moderate demand and prices are fairly firm. We quote Standard Bessemer Iron at \$13.25 to \$13.50, Pittsburgh, for small lots. Forge Iron is \$12.75 to \$13, with reports of sales as low as \$12.50; No. 2 Foundry is \$13.75 to \$14. We note a sale of 1000 tons of Standard Bessemer Iron for Ingot mold use at \$13.25, Pittsburgh; also a sale of 300 tons of Northern No. 2 Foundry at \$13.75.

Billets.—We have advices that the Billet market seems stronger, and a sale of 250 tons of Bessemer Billets is reported on the basis of \$17.50, maker's mill; for large lots and extended delivery it is probable \$17 could still be done. Basic Open Hearth Billets are selling at \$17.50 up to \$19 for high Carbons.

Sheet and Tin Bars.—We continue to quote Long Sheet Bars at \$20, Pittsburgh.

Muck Bar.—The market seems weak and we quote Standard grades at \$24.75, Pittsburgh, and note a sale of 1500 tons at that price.

(By Mail.)

In the past week there has been more of a disposition in the iron trade to discount the result of the election, and a good deal of tonnage has been placed with the

mills. The largest contracts in the week were those of Pennsylvania Railroad for 150,000 tons of Rails, divided between Carnegie Steel Company, Cambria Steel Company, Lackawanna Iron & Steel Company and National Steel Company, and the material for the approaches to the East River Bridge, some 20,000 tons, which will likely be furnished by a Pittsburgh mill. The Pig Iron market continues quiet, with prices inclined to weakness, due to heavy stocks at the furnaces and in the mill yards. The Steel market is also dull, and there are reports of some low prices being made. The situation in Finished Material is unchanged as to prices, but the volume of business seems to be increasing, and some in the trade advise us that deliveries on certain kinds of material are hard to get. The mills are comfortably filled with tonnage for the next 60 days, but there is no indication of prices advancing, for the present at least. There is a general belief in the Iron trade that should the present administration be continued there will be an upward turn in values on all kinds of Iron and Steel products right after the election. Already there is a buoyancy in the trade that is regarded as a forerunner of higher prices. The stock market is referred to as giving evidence of this, nearly all the industrials in the past few days scoring advances.

Ferromanganese.—There is very little doing, and we continue to quote 80 per cent. domestic at \$75, delivered.

Plates.—The contract for the Steel approaches to the East River Bridge has been placed with the Pennsylvania Steel Company, at Steelton, Pa., at their bid of \$2,411,000. There will be about 20,000 tons of material in this work, 8000 tons of Plates and 12,000 tons of Shapes, all of which will be Acid Open Hearth Steel. It is presumed this material will be furnished by a local interest. The general demand for Plates is only fair, and the market does not show any disposition to advance. We cannot quote an active business in Fire Box Steel of the higher grades. The locomotive shops throughout the country are busy, and are placing quite liberal orders for Fire Box Steel. We quote Tank Plate, ½-inch and heavier, 1.10c.; Shell, 1.20c.; Flange, 1.30c.; Fire Box Steel, 1.50c. for ordinary grades and up to 3c. for special grades.

Structural Material.—No large jobs have recently been placed, but there is a good deal of tonnage moving in small lots. A buyer for a house in Egypt was in Pittsburgh the other day, and stated that two large office buildings and a bank building were being erected in Khartoum, Egypt, of Steel. He referred to that market as being a promising one for American mills. A good deal of bridge work is being given out, and the American Bridge Company are operating practically all their plants to full capacity. The present price of Beams is regarded as entirely fair by the mills, and will not be made any lower. We quote: Beams and Channels, up to 15-inch, 1.50c.; over 15-inch, 1.60c.; Angles, 3 to 6 inches, inclusive, 1.40c.; over 6 inches, 1.50c.; under 3 inches, 1.25c.; Zees, 1.50c.; Tees, 1.55c.; Bars, 1.10c. to 1.15c.; Universal and Sheared Plates, 1.10c., all f.o.b. Pittsburgh.

Bars.—There is only a fair tonnage being placed in both Iron and Steel Bars, but the tone of the market seems stronger than a week ago. Some of the large mills rolling Steel Bars are pretty well filled up with contracts taken some time since, and are firm in their ideas as to prices, holding Steel Bars at 1.10c. minimum at mill, half extras. It would take a very nice specification to shade this price. Iron Bars are held at 1.20c. to 1.25c., Valley mill, the lower price for large lots and nice sizes to roll. Refined Iron Bars are quoted at 1.50c. to 1.75c., at mill. Some sellers hold firmly, they advise us, for the higher figure.

Merchant Steel.—There is considerable new business being placed, which with old contracts taken some time since keeps the mills well filled up. Prices are firm, and we quote: Tire Steel, 1.25c.; Toe Calk, 1.35c., in carload lots; Open Hearth Machinery, 2c. to 2.10c.; Open Hearth Spring, 2c. to 2.10c.; Plow Slabs, Bessemer, 2c., base; Open Hearth, 2.25c., base; Hammered Lay Steel, 3c.; Rolled Lay, 2.50c. to 2.75c.; Cold Rolled Shafting, 60 and 10 per cent. off in carloads; Tool Steel, 7c. and upward, depending on quality. On Tool Steel freight is allowed. Terms are 60 days, 2 per cent. off for cash in ten days.

Steel Rails.—As usual, the Pennsylvania Railroad has led off and placed an order for 150,000 tons of Rails at the reported pool price of \$26 a ton. As expected, all sorts of reports are going as to rebates to be given on this order, but these have not been authenticated. The order is shared in by all the large companies, except Federal Steel and Colorado. It is claimed that this is only the forerunner of other large contracts for Rails

to be placed by the leading roads within a week or two, or at the furthest, right after the election.

Sheets.—There is a moderate volume of business in the Sheet trade, but mostly for carload lots. It is believed that just as soon as the election is over there will be heavy orders placed for Sheets, and possibly prices may be higher. Stocks with jobbers and consumers are light, and have been for some time. We quote No. 27 Black Sheets, box annealed, one pass through cold rolls, at 2.80c. to 2.85c.; No. 28, 2.90c. to 2.95c. These prices represent the general market, and would not be shaded, except for very desirable specifications. We quote Galvanized Sheets at 75 per cent. off, 15c. freight, in carload lots. In exceptional cases, and for good orders, this price on Galvanized might be slightly shaded.

Skelp.—With the signing of the Amalgamated Association scale several idle Skelp mills of the leading Pipe interest have been started up, and the pressure on the mills for deliveries of Skelp has been removed to some extent. The market on Iron Skelp is firm, and we quote Grooved at 1.40c. to 1.45c. and Sheared at 1.45c. to 1.50c. For very narrow or very wide sizes higher prices are asked. We quote Grooved and Sheared Steel Skelp at 1.30c. to 1.35c., delivered. We note a sale of 1500 tons of Grooved Iron Skelp at 1.40c., delivered, Pittsburgh.

Pipes and Tubes.—We continue to note an active demand for Tubular goods, particularly for Oil Well Supplies. There is a good deal of export business being placed, and shipments to South Africa, which were interrupted by the war, will shortly be resumed. The market on Pipe is firm, and we are advised that prices are being rigidly held. We quote:

Merchant Pipe.

| | Black. Per cent. | Galvd. Per cent. |
|------------------------------------|---------------------|---------------------|
| ½ to ¾ inch and 11 to 12 inch..... | 61 | 48 |
| ¾ to 10 inch..... | 68½ | 56 |

Casing, Random Lengths.

| | S. & S. | I. J. |
|---------------------|---------|-------|
| 2 to 3 inch..... | 58 | 53½ |
| 3¼ to 4 inch..... | 63 | 59 |
| 4¼ to 12½ inch..... | 65 | 61½ |

Casing, Cut Lengths.

| | S. & S. | I. J. |
|---------------------|---------|-------|
| 2 to 3 inch..... | 53½ | 49 |
| 3¼ to 4 inch..... | 59 | 55 |
| 4¼ to 12½ inch..... | 61½ | 57½ |

Boiler Tubes.

| | Up to 22 feet. Per cent. | 22 feet and over. Per cent. |
|------------------------------------|-----------------------------|--------------------------------|
| Steel. | | |
| 1 inch to 1½ inch and 2½ inch..... | 49½ | 44½ |
| 1¾ to 2¼ inch..... | 45 | 39½ |
| 2½ to 13 inch..... | 57 | 52½ |
| Iron. | | |
| 1 inch to 1½ inch and 2½ inch..... | 49½ | 44½ |
| 1¾ to 2¼ inch..... | 45 | 39½ |
| 2½ to 13 inch..... | 57 | 52½ |

Prices to jobbers are about 5 per cent. less than the above.

Connellsville Coke.—The Coke trade is holding up remarkably well, and production is increasing. Last week out of 20,612 ovens in the Connellsville region, 14,180 were active and 6432 idle, the output having been 158,730 tons, an increase over the previous week of nearly 8000 tons. As yet there is very little demand for Furnace Coke, but it is believed that after the election a number of blast furnaces will start up and the demand for Furnace Coke increase. We can note a fairly active demand for Foundry Coke and shipments are large. The price of strictly Connellsville Furnace Coke is held by the large operators at about \$2, but this price is being shaded by the smaller Coke makers. The price of strictly Connellsville 72-hour Foundry Coke is \$2.25 to \$2.50 a ton, but this is also being shaded in some cases. Prices on main line Furnace and Foundry Coke, made outside the Connellsville region, are much lower than the above.

Scrap.—The event of the week in the Scrap trade was the sale of a large lot of Scrap of various kinds, consisting of Railroad and Pit Rails, Car Wheels, Car Irons, portions of Mining Machines and Pipe by the Pittsburgh Coal Company, to Max Solomon, a Scrap dealer of Beaver Falls. There was about 900 tons all told, and flat price of \$15 a ton was paid. There is more inquiry for Scrap and more material is changing hands, but prices are no better. We quote: No. 1 Railroad Wrought Scrap, \$11.50, net ton; Old Iron Rails continue scarce and we quote at \$16.50, gross ton; Old Steel Rails are about \$12; Tank and Pipe Scrap, Sheared, \$7.50; Turnings, \$5; Cast Iron Borings, \$5; Soft Busheling Scrap, \$11; Old Horseshoes, \$10 to \$10.50, and Low Phosphorus Melting Stock, \$15 to \$15.50, all in gross tons, except Horseshoes, which are net ton.

Birmingham.

BIRMINGHAM, ALA., October 15, 1900.

As yet is not an easy task to accurately and correctly report what Iron is doing. That the atmosphere is clearing and a steadier feeling developing seems plain. Some Iron, particularly of the lower grades, that was in a measure tied up, was turned loose the past week at prices it would not be fair to quote. The sale was in a measure a forced one, and a chip was knocked out of prices when it changed ownership. It is now out of the way, and no other lots are likely to influence the market in a baneful way. Such lots create the suspicion that there are more to come out and fill buyers with suspicion and keep them on the *qui vive*.

The demand has been on the increase and sales have been larger. Prices are yet a little irregular, but there is a growing tendency to more uniformity. Some interests that took on moderate purchases insisted on immediate shipments to enable them to keep going. This is the best evidence that could be adduced of the low ebb of stocks in melters' hands. One interest reports sales fully up to the week's output. Another registered sales of 7000 tons. All report a medium trade, with a growing tendency. As to prices, the evidence is pretty strong that some Gray Forge, sold for account of a neighboring district, went at \$9. Some went at \$9.25 and some at \$9.50. Sales are reported as high as \$10, but the latter represents small order trade. The scarcity of and the demand for No. 3 Foundry are accentuated by sales at \$10.50, while No. 2 Soft was sold at \$10.50 also. All sellers are not so fortunate as to be stocked with No. 3 Foundry. No. 2 Foundry is, as a rule, held at \$10.75, and at this price to \$11 some No. 1 Soft could be had. No. 1 Foundry is very scarce. When one can find a batch of it he is willing to take it, if in need of it, at \$12, the asking price. While No. 2 Foundry is quoted at \$10.75 it is possible that some can be had at \$10.50, but it would now be an exceptional case. Take it all in all, while one cannot say that outside prices have been moved up, still inside prices have been pulled in and the margin between them is narrowing. It can therefore be said of the market that the tone is better.

The export trade is flat. There is no movement in it as yet for reasons previously mentioned. The figures show that for the month of September export shipments from Alabama and Tennessee aggregated 55,000 tons. Of this amount about 53,000 tons went from the Birmingham district. The showing for this month will not be so large, but it will be very respectable.

In placing the recently completed furnace of the Tennessee Company at Ensley in blast one of the flues became choked with gas. An explosion followed, with nominal damage. The labor union have presented an ultimatum to the Steel plant at Ensley, demanding "under which king" their flag will be unfurled. They require that the mill shall employ only members of the union, and conduct it according to their rules and regulations, applicable to all enterprises controlled and dominated by the Union Labor Order. The management announced that their mill was an open mill and that they proposed to employ acceptable labor at their pleasure and discretion, without regard to affiliations with labor orders, race or religious creeds, and the management of their business they proposed to keep in their own hands. The result is an incipient strike. Between 30 and 40 employees have walked out. They say 100 will go out. The mill is running as usual and the management declare that under no circumstances will they accede to the demand made. There is no question as to wages paid, no complaints of wrongs to be righted—but just the simple demand that the mill declare itself a union mill and be conducted according to the conclusions or decisions of the committee appointed by the order to run it for the owners.

It is said that of all the mills of this character in the United States but three are union mills, and they have a very limited capacity. The fight is on "to a finish," and the conclusion of it will have more or less influence on affairs here interested in the result. When in September the scale was signed, that ought to have been the time to bring up the question and settle it. As it is, it gives one the idea that it was kept in abeyance to spring at a more opportune time for success. Strikes here are not popular. Work can be had for the asking, and in no industrial district in the country is the scale of wages fairer or more liberal than prevails here. Unreasonable demands as pretexts for strained concessions find little sympathy with the community at large.

The Alabama Car Service Association reports movement of cars for September at 33,771, as against 36,529 for September, 1899. The decrease is accounted for by the statement that cars wanted could not be obtained. The fact that facilities for transportation must be increased here is evidenced by the fact that of 30 locomotives of large power recently ordered by the South-

ern Railroad, about half the number are destined for this district. The active prosecution of various industries in operation and to be operated is hampered by the lack of desired labor. Those in operation now would be glad to lengthen their labor roll, while those to open are nonplussed as to from where they are to draw labor. The main source will be the cotton sections of the South, where the laborer seldom sees any cash from crop to crop, and to whom regular pay days and fair wages are irresistible arguments in favor of a migration to where work and cash both abound in plentiful supply.

Some well posted operators are predicting an increase of 1,000,000 tons in the Coal output this year. If facilities for supply kept pace with the demand, it would greatly exceed that amount. Stated tersely, the demand greatly exceeds facilities of output. It will take time—and a long time—to equalize the two great factors of demand and supply.

Cleveland.

CLEVELAND, OHIO, October 16, 1900.

The drawing near of the end of the season of navigation is calling attention to a condition on the Ore docks and the Ore stock piles of the furnaces which has not been apparent hitherto. Vessels operating under contracts to carry Ore will complete their labors November 1, by which time it is expected that the full amount of Ore which was sold a year ago will have been carried down the lakes. Vesselmen find, therefore, that their tonnage will not be employed beyond that time unless more Ore is sold in the meantime, of which there is no indication. The Ore docks at the lower lake ports are almost congested with what they have received of late, no shipments to amount to anything having been made to the furnaces, which now have all the Ore they need to keep them going well on into next year. The prospects are for the earliest closing of the season of navigation that the lakes have seen in years, as many of the big Ore boats and especially those owned by the Steel concerns will be tied up to their dock at the end of the contract season.

Pig Iron.—In Pig Iron it is a buyer's market. On Foundry Irons there is still a nominal quotation of \$15 on No. 1 and \$14.50 on No. 2, but there are cases reported where small lots of No. 2 have been sold as low as \$13.50. Valley furnace, Bessemer Pig is still being quoted at \$14, Cleveland, with but very little business at that figure.

Finished Material.—The first sale of Steel Rails under the new price, \$26, was made last Saturday. The lot was small, but it was considered enough, in the light of reports from other parts of the country, to fix the price, temporarily at least. Buyers, while conceding that the market has been established at \$26, have decided to order now only what they have immediate need for, believing that the drop will eventually come. Some of the largest roads in this section have hung up their orders waiting for a change in the prices. Of the 50,000 tons that was reported a week ago as being in prospect probably only 50 per cent. will be closed now. A large amount of work is in sight for the electric lines in Northern Ohio, but the projectors of these roads are waiting for the market to settle. Plates have shown a tendency to weakness, especially in the heavier grades. Tank Plate is now being sold at 1.15c. in this city, equal to 1.05c., Pittsburgh. The demand for it is light, and some of the mills are running only on part time, because of the lack of orders. Light Plates are in better demand, it being next to an impossibility to get deliveries before January 1. The situation as to Bars is desperate, it being impossible to get deliveries before January 1, and the need of some of the consumers being urgent. The prices are as they were, 1.15c. to 1.20c., no change being seen. The demand for Beams and Channels is good, save as to the larger sizes. There has been a rumor this week that the price of Angles was to be broken, or had been, a drop of ¼c. being spoken of. This seems to be groundless, unless it means that two of the mills outside of the agreement, which make Angles, are cutting prices and threaten to cause the association mills to make a similar reduction to meet the prices. There is nothing being done in Billets, not enough in fact to warrant a quotation of the market.

Old Iron.—This week has seen a slight inquiry for Bessemer Pig, but it has not developed as yet into any sales, hence no price can be quoted that would be comprehensive. The trade in Old Rails appears to be the largest part of the business just now, and even that has been light of late. There is also a small business in Axles, but that has also been light. Old Rails are still quoted at \$17. The dealers are still buying in about all of the Scrap they can get hold of, believing that the market promises well for the near future.

Cincinnati. (By Telegraph.)Office of *The Iron Age*, Fifth and Main streets, {
CINCINNATI, October 17, 1900. }

The situation in Pig Iron has not changed materially since a week ago. The pendulum has swung toward the optimistic side, so far as feeling goes, and there is some reason for it in the fact that buyers are showing more active interest and asking for information, which betokens more than mere curiosity. Actual ordering is still confined to small, quick shipment orders. These are increasing in number, and, of course, represent quite a fair lot of iron in the aggregate. There is a wide divergence of opinion as to values, but all who have the iron to ship are either selling at or close to the minimum figures herewith or are stacking it up in their yards. This, of course, does not hold good in cases where the furnace happens to be behind on old higher priced orders. There is an expression in some quarters here that the election result is being discounted, and that the situation will show more activity from now on in consequence. Freight rate from Birmingham is \$2.75 to this point; from the Hauging Rock district, \$1. We quote, f.o.b. Cincinnati:

| | |
|--------------------------------|--------------------|
| Southern Coke, No. 1..... | \$14.00 to \$14.75 |
| Southern Coke, No. 2..... | 13.00 to 13.75 |
| Southern Coke, No. 3..... | 12.25 to 13.00 |
| Southern Coke, No. 4..... | 11.50 to 12.50 |
| Southern Coke, No. 1 Soft..... | 13.75 to 14.75 |
| Southern Coke, No. 2 Soft..... | 12.75 to 13.75 |
| Southern Coke, Gray Forge..... | 11.25 to 12.25 |
| Southern Coke, Mottled..... | 11.25 to 12.25 |
| Ohio Silvery, No. 1..... | 17.50 to 18.25 |
| Ohio Silvery, No. 2..... | 16.50 to 17.25 |
| Lake Superior Coke, No. 1..... | 15.00 to 15.50 |
| Lake Superior Coke, No. 2..... | 14.00 to 14.50 |
| Lake Superior Coke, No. 3..... | 13.00 to 13.50 |

Car Wheel and Malleable Irons.

| | |
|---|--------------------|
| Standard Southern Car Wheel, chilling grades..... | \$20.75 to \$21.25 |
| Standard Southern Car Wheel, No. 2..... | 19.75 to 20.25 |
| Lake Superior Car Wheel and Malleable..... | 19.00 to 20.00 |

Plates and Bars.—There has been more activity in a small way, and on the basis of present quotations the market is about steady. For the present there are no indications of increasing activity. We quote, f.o.b. Cincinnati: Iron Bars, carload lots, 1.50c., with half extras; in small lots, 1.75c., with full extras; Bar Steel, carload lots, 1.40c., with half extras; small lots, 1.75c., with full extras; Iron Bar Angles, 1½ x 3-16 and larger, in car lots, 1.75c.; small, 2.25c.; Sheets, No. 10, 2.25c.; No. 27 Steel, 3c.; Plates, 1.70c. to 2c.

Old Material.—The market is quiet and unchanged. Dealers' buying prices per gross ton, f.o.b. Cincinnati, are about as follows: No. 1 Wrought Railroad Scrap, \$11 to \$12; Cast Railroad and Machine Scrap, \$10 to \$11; Iron Axles, \$14 to \$15; Iron Rails, \$12 to \$13; Car Wheels, \$14 to \$15.

St. Louis. (By Telegraph.)Office of *The Iron Age*, 1205 Chemical Building, {
St. Louis, October 17, 1900. }

Pig Iron.—The market is more cheerful in tone than some weeks past. Inquiries have been coming in the past few days, which aggregate a fairly large tonnage. While a great part of the correspondence mentions limited wants, there is a sufficient proportion carrying larger needs to indicate a more stable condition all around. Something over 1000 tons were sold to a local foundry at present prices for delivery commencing January 1. Small orders are daily plentiful, and this character of business is especially insistent on quick deliveries. Inquiry is noted for Ohio, High Silicon, Bessemer and Special Silicon for Steel and Malleable use, but no deals have as yet been closed. It was generally supposed that the buying movement would not set in until election matters had been settled. While the present aroused interest in the market does not guarantee a permanent condition it is a distinct improvement on the happenings of several months past. It may be truly said of the general iron and steel trade that more confidence is expressed of the freedom from business disturbances as election day approaches. We quote, f.o.b. cars, St. Louis:

| | |
|------------------------------|--------------------|
| Southern, No. 1 Foundry..... | \$14.50 to \$15.00 |
| Southern, No. 2 Foundry..... | 13.50 to 14.00 |
| Southern, No. 3 Foundry..... | 12.75 to 13.25 |
| No. 1 Soft..... | 14.50 to 15.00 |
| No. 2 Soft..... | 13.50 to 14.00 |
| Gray Forge..... | 12.25 to 12.75 |

Bars.—Inquiry, both to mills and jobbers, is in good volume. No notable individual tonnage has come into view, buyers seeming content rather to keep nearby necessities covered. Mill prices for heavy tonnage are 1.30c. to 1.40c. for Steel; Iron, 1.40c. to 1.45c., half extras. Jobbers quote carloads from mill at 1.65c., full extras, for Steel; smaller lots of Steel and Iron range from 1.75c. to 1.90c., full extras.

Rails and Track Supplies.—The demand for Track Supplies is said to continue in surprisingly good force. Roads seem to be energetic in putting trackage in good shape for the winter. We quote Splice Bars, 1.35c. to 1.75c.; Bolts, with Square Nuts, 2c. to 2.10c.; with Hexagon Nuts, 2.10c. to 2.20c.; Spikes, 1.70c. to 1.80c.

Pig Lead.—The Lead market does not show any pronounced change. There is said to be quite a tonnage of Missouri brands in the hands of speculators, who are willing to let it go at comparatively low prices. A car was sold at 4.25c., and it is said that 4.22½c. will take larger lots. Tendency to take hold is not, however, pronounced. Desilverized is unchanged at 4.32½c. Lead Ore remained stationary at \$45 per ton.

Spelter.—There is but little activity in this metal. There was an export transaction for 2000 tons closed up a few weeks ago, on which shipments are now going forward. The Cherokee Lanyon Spelter Company have closed down indefinitely four blocks of Coal furnaces at Works No. 2, Pittsburg, Kan. These furnaces will not be dismantled, but will be held in readiness to start up at a week's notice. While this step has been taken with the Coal smelters the company are arranging for an addition of two blocks of gas smelters to Plant No. 10, at Iola, Kan. Spelter at last sale brought 3.98c.; 4c. is now asked. Zinc Ore values were as last week, the top price having been \$28.50.

The British Iron Market.

Summary.—There is a quiet tone throughout the Iron and Steel trades of the country, and prices in many cases are maintained with difficulty, while several reductions are reported during the week. In the Pig Iron market new business is scarce, and the operations which have taken place are of a hand to mouth character. The finished branches are also rather dull, and sales are effected slowly; but, at the same time, the number of inquiries to hand is encouraging. The engineering trades are busy in some of the special branches, but, taking the position all through, contracts appear to be running out faster than new work comes in. The American market is weak, and on the Continent trade is dull.

Pig Iron.—The Pig Iron market has been without animation, and price has a downward tendency. The Glasgow warrant market has fluctuated a good deal, and prices of Scotch, which we quoted last week at 66 shillings 10½ pence, had on Tuesday fallen to 65 shillings 7½ pence; but on the following day a complete change took place, and 67 shillings 3 pence was quoted. Yesterday the figure was 66 shillings 11 pence. There have been practically no dealings in Cleveland warrants, and yesterday they were not quoted, while West Coast Hematites are at 76 shillings 6 pence. There can be little doubt that the general election has done much to check business and to intensify the dullness of the week; but it is to be feared that the other conditions which have gone to bring about the present situation are not so ephemeral as the political excitement, and although there may be some little improvement when that has passed away, the more permanent unfavorable factors will most likely remain. The general recognition of this probability is the reason, no doubt, why buyers are shy of engaging in any business beyond that necessary for the supply of immediate requirements. They are waiting for further reductions, and although in some districts, South Staffordshire for instance, makers are shutting down furnaces, and the consequent decrease in the output renders any further decline unlikely, the prospects of any material improvement this year are not considered encouraging. The following is a statement of the public stocks in tons:

| | Tons. | Decrease during 1899. |
|---|--------|-----------------------|
| Conna's at Glasgow..... | 87,567 | 156,012 |
| Conna's at Middlesbrough..... | 11,741 | 55,130 |
| Railway Stores, Middlesbrough..... | 3,380 | 8,948 |
| Conna's at Middlesbrough, Hematite..... | 555 | 155,087 |
| Hematite, West Coast..... | 42,700 | |

Manufactured Iron and Steel.—In the finished branches business is not brisk, although there are not wanting favorable symptoms which seem to promise some improvement in the future. Makers in some districts, however, appear to have recognized the necessity of reductions on former prices, and the South Yorkshire Bar Iron Association has decided upon a drop of £1, the new quotation being £9 10s., while in North Staffordshire, too, common Iron has been put down, the present quotations being about £9 10s. to £10. At the same time wages are going up. The ascertainment of the average selling price of Scottish Iron during July and August shows that it was £8 17s. 8.29d. per ton, which gives the men a 2½ per cent. advance, while in South Wales wages go up 3 per cent., Steel Rails and Tin Bars for the

three months ended August being shown to have averaged £6 9s. 10d.

Engineering and Shipbuilding.—In the engineering trades there is rather less new work coming forward outside one or two special branches. The most unsatisfactory section of the trade is that connected with the manufacture of textile machinery, and practically all the leading establishments are becoming very short of work. Machine tool makers, although well engaged for the present, are not replacing work as it runs out, and the same applies to stationary engine builders and the general engineering industries. All branches of electrical engineering, however, continue exceedingly busy. The shipbuilding industry is busy on new orders recently booked and in completing older contracts, and the outlook is distinctly encouraging.

Foreign.—On the Continent depression is noticeable in the French Finished Iron trade. The Belgian Ironmasters are doing a rather better business on home account, and the State is distributing a number of fresh orders for Rail accessories and other material. In Germany the late active revival is being followed by a period of dullness, and the amount of business doing is becoming more and more restricted every week.

Comparison of Prices.—The annexed table shows the current prices compared with those of last week, and of the corresponding period last year:

| | Oct. 4, 1900. | Sept. 27, 1900. | Oct. 5, 1899. |
|--|------------------|--------------------|------------------|
| | s. d. | s. d. | s. d. |
| Iron Ore— | | | |
| Rubio, Middlesbrough..... | 21 6 | 21 6 | 18 0 |
| Rubio, Cardiff..... | 20 6 | 20 6 | 16 6 |
| Pottery Mine, North Staffordshire..... | 20 6 | 20 6 | 14 6 |
| Hematite, West Coast (at mines)..... | 19 6 | 19 6 | 16 6 |
| Pig Iron— | | | |
| No. 3 Foundry, Middlesbrough..... | 68 9 | 69 6 | 67 9 |
| Warrants..... | 68 0 | 68 0 | 67 7 |
| Scotch Warrants, Glasgow..... | 66 11 | 66 10½ | 68 1 |
| Hematite Warrants, West Coast..... | 76 6 | 77 9 | 71 10 |
| Cold Blast (Foundry), South Staffordshire..... | 130 0 | 130 0 | 110 0 |
| Welsh Hematite, Cardiff..... | 80 0 | 84 0 | 82 6 |
| Manufactured Iron and Steel— | | | |
| Marked Bars, South Staffordshire..... | 11 10 0 | 11 10 0 | 10 0 0 |
| Common Bars..... | 10 10 0 | 10 10 0 | 9 0 0 |
| Steel Rails, Middlesbrough..... | 7 2 6 | 7 2 6 | 6 15 0 |
| Steel Rails, West Coast..... | 7 5 0 | 7 5 0 | 6 10 0 |
| Steel Rails, Cardiff..... | 7 0 0 | 7 0 0 | 6 10 0 |
| Steel Angles (eng.), Middlesbrough..... | 8 10 0 | 8 10 0 | 7 10 0 |
| Steel Angles (eng.), Glasgow..... | 8 0 0 | 8 0 0 | 7 7 6 |
| Steel Plates (ship), Middlesbrough..... | 8 0 0 | 8 0 0 | 7 15 11 |
| Steel Plates (ship), Glasgow..... | 8 0 0 | 8 0 0 | 7 15 0 |
| Tin Plates, Bessemer IC Cokes, South Wales..... | s. d. 14 0 | s. d. 14 0 | s. d. 15 6 |

—Iron and Coal Trades Review, October 5, 1900.

New York.

Office of *The Iron Age*, 232-238 William street, }
NEW YORK, October 17, 1900. }

Pig Iron.—Business has been very quiet during the past week, both on domestic and export account. A report has been current to the effect that a hitherto unimportant interest have purchased a lot considerably in excess of 10,000 tons, but we have been unable to confirm it. Quotations are as follows at tidewater: Lehigh, Schuylkill and Virginia Irons, No. 1, \$16.50 to \$18; No. 2 X, \$15 to \$16; No. 2 Plain, \$14 to \$15; Gray Forge, \$13.75 to \$15. Tennessee and Alabama brands, No. 1 Foundry, \$15.25 to \$15.50; No. 2 Foundry, \$14.25 to \$14.50; No. 1 Soft, \$15.25 to \$15.50; No. 2 Soft, \$14.25 to \$14.50; No. 3 Foundry, \$13.50 to \$14; No. 4 Foundry, \$13 to \$13.50; Gray Forge, \$13 to \$13.50.

Cast Iron Pipe.—The market is very quiet, and even the demand for small lots is not up to expectations. The only large inquiry in the market is a lot of about 2000 tons for a Steel company in Western Pennsylvania. We continue to quote for 8-inch Pipe, \$23 to \$23.50 per gross ton, at tidewater.

Steel Rails.—So far as can be learned the management of the Pennsylvania Railroad, while it has decided to purchase about 150,000 tons of Steel Rails for next year's delivery, has not actually distributed the order as yet to the different mills on the line of the road. A Southern road is reported to have purchased a 10,000-ton lot of Steel Rails, rolled some time since by an Eastern mill, but not laid because the expected charter was not secured. We quote \$26 for Standard Sections, \$25 and \$26 for Light Sections, and \$38 to \$38.50 for Girder Rails. We quote Spikes, 1.45c. to 1.50c.; Splice Bars, 1.25c. to 1.35c.; Square Track Bolts, 2.05c. to 2.15c., and Hexagon Bolts, 2.20c. to 2.25c.

Finished Iron and Steel.—Early in the week the Pennsylvania Steel Company secured the important work for the East River Bridge. Generally speaking, the market is quiet and steady. We quote as follows at tidewater: Beams, Channels and Zees, 1.65c. to 1.70c.;

Angles, 1.30c. to 1.40c.; Tees, 1.65c. to 1.75c.; Bulb Angles and Deck Beams, 1.90c. to 2c.; Universal Mill Plates, 1.25c. to 1.30c. Sheared Steel Plates are 1.20c. to 1.30c. for Tank, 1.35c. to 1.40c. for Shell, 1.50c. to 1.70c. for Flange, 2.10c. to 2.30c. for Fire Box, 3.50c. to 4c. for Locomotive Fire Box, on dock. Charcoal Iron Plates are held at 2.25c. for C. H. No. 1, 2.75c. for Flange, and 3.25c. for Fire Box. Refined Bars are 1.30c. to 1.35c.; Common Bars, 1.15c. to 1.35c.; Soft Steel Bars, 1.15c. to 1.30c., and Hoops, 1.90c. to 2.25c., base, on dock.

Metal Market.

Office of *The Iron Age*, 232-238 William street, }
NEW YORK, October 17, 1900. }

Pig Tin.—As has been the case for many preceding weeks, this market has again fluctuated according to the dictates of the London market. Every movement in London was followed by this market, and at the close to-day prices are considerably lower than they were a week ago. Throughout the whole week there was only a slight business doing, however. Closing prices to-day named 27.95c. to 28.25c. for spot. The steamer landing sellers were in the market at 28½c., and October and November were obtainable at 28c. The London market also shows a sharp decline, to-day's prices especially having a receding tendency. At the close spot was quoted £129 5s., and the future price was £124 5s. To-day's bulletin sale at Batavia went at an equivalent of £124 10s., c.i.f., Holland. Straits shipments for the first half of this month amounted to 1895 tons, as against 1665 tons for the same period last year.

Copper.—Our market was slow and unchanged. No business of importance is reported and transactions are said to have been limited to very small lots. Lake Superior Ingot is still quoted 16¼c. to 16½c., and the figure given for Electrolytic is 16½c. Reports are current, however, of export sales of Electrolytic at 16½c. The London market has steadily declined and closes to-day with sellers at £71 17s. 6d. for spot and £72 8s. 9d. for three months' futures. Best Selected has declined 10 shillings and is quoted £79 flat.

Pig Lead.—Business is very quiet, prices unchanged and the situation is generally dull. The American Smelting & Refining Company still adhere to their figures of 4½c., New York, and 4.32½c., St. Louis. It is said, however, that Soft Missouri Lead is obtainable at 4.22½c., St. Louis, and it is inferred from this that there may be a lowering of the combination price. London has declined 5 shillings, being quoted to-day £17 12s. 6d.

Spelter.—There is no change in this market. It is very dull and shipments from the West are offered at 4.15c., with 4.10c. bid. London has fluctuated considerably, closing to-day at £19 10s., which is 5 shillings higher than last week's figure.

Antimony.—Is unchanged. Hallett's is quoted 9½c., and Cookson's 10½c.

Nickel.—There is no change, the metal remaining as strong as ever, with only small lots offering. Prices of small lots are 55c. to 60c.

Quicksilver.—Is unchanged, prices quoted here being \$51 per flask of 76½ pounds for lots of 50 flasks or more. London cables £9 2s. 6d.

Tin Plates.—A fair business is reported, but buyers do not seem to be engaging far ahead. The plants are all running smoothly and are pretty busy on back orders. The American Tin Plate Company are still quoting on a basis of \$4.19 per box of Standard 100-lb. Cokes, New York delivery, and \$4, f.o.b. mills.

John Stanton reports the Copper production in the United States and of the foreign reporting mines and United States exports as follows, in gross tons of 2240 lbs.:

| | Reporting mines. | Outside sources. | Total U.S. product. | U.S. foreign mines. | U. S. exports. |
|-----------------------|---------------------|---------------------|------------------------|------------------------|-------------------|
| First half 1895..... | 70,612 | 9,100 | 79,712 | 42,484 | 34,215 |
| Second half 1895..... | 84,885 | 6,600 | 91,485 | 43,674 | 30,507 |
| Total 1895..... | 155,497 | 15,700 | 171,197 | 86,178 | 64,722 |
| First half 1896..... | 94,180 | 7,200 | 101,380 | 42,255 | 58,216 |
| Second half 1896..... | 95,314 | 7,200 | 102,514 | 43,941 | 67,287 |
| Total 1896..... | 189,494 | 14,400 | 203,894 | 86,196 | 125,503 |
| First half 1897..... | 103,651 | 5,000 | 108,651 | 44,263 | 64,870 |
| Second half 1897..... | 100,555 | 6,900 | 107,455 | 44,007 | 64,340 |
| Total 1897..... | 204,206 | 11,900 | 216,106 | 88,270 | 129,210 |
| First half 1898..... | 112,687 | 7,800 | 120,487 | 40,880 | 68,284 |
| Second half 1898..... | 103,535 | 10,250 | 113,785 | 43,674 | 76,831 |
| Total 1898..... | 216,222 | 18,050 | 234,272 | 84,554 | 145,115 |
| First half 1899..... | 111,987 | 12,500 | 124,487 | 43,629 | 66,460 |
| Second half 1899..... | 118,818 | 18,900 | 137,719 | 45,611 | 63,351 |
| Total 1899..... | 230,806 | 31,400 | 262,206 | 89,240 | 119,811 |
| First half 1900..... | 114,177 | 20,400 | 134,577 | 43,153 | 90,747 |
| July, 1900..... | 19,612 | 3,400 | 23,012 | 7,443 | 11,636 |
| August, 1900..... | 17,667 | 3,400 | 21,067 | 7,535 | 13,861 |
| September, 1900..... | 17,986 | 3,400 | 21,346 | 7,145 | 10,425 |

The New York Machinery Market.

Office of *The Iron Age*, 232-234 William street,
NEW YORK, October 17, 1900.

There are a number of very good things under way, but the inclination to wait until after the result of the election is known seems more pronounced than ever. We know of a number of concerns who have received all prices and necessary data, and have everything in readiness for closing, but they have written to the trade that they would withhold their decision until after election. There are so many projects held up in just this way that merchants who are sanguine as to the result of the political contest state that they anticipate quite a rush during next month. It is not thought probable that prices will be advanced any, but it is asserted that if a fair percentage of the business now in the balance falls in the right direction a stop will be put to the price cutting which is now being indulged in. In all, a much better state of affairs is looked for during next month.

That the political situation is commanding a good deal of attention among the machinery trade is evidenced by the fact that they are more willing to talk politics than business. A great many of the machinery concerns down town have banded themselves together in what is styled the Machinery and Metal Trade Association. While the meetings of the association have dealt with the business situation generally they have also been interspersed with politics. The association occupy offices in the North American Trust Building, at Cedar street and Broadway. Charles A. Moore is the president, Max Nathan vice-president, A. L. Merriam treasurer and C. L. Waterbury secretary.

Considerable interest is being manifested in the trade regarding the proposed purchases of battle ships and cruisers by the Navy Department. It is thought that the awards will decide whether or not extensive improvements will be made at certain shipbuilding plants. Most prominent of these is that of Wm. R. Trigg of Richmond, Va. It is also thought that if the Fore River Engine Works of Weymouth, Mass., secure a good contract they will further increase their plant materially. The project of establishing a large shipyard in New York Harbor is again spoken of. We have been unable to confirm present reports, but it is stated that a prominent shipbuilder has interested a party well known among the steel magnates.

A large amount of machinery for the Russian Government is now being figured on by prominent Liberty street interests. The work is coming through a lower William street Russian export and import house. Details are not to be had at this time, as it is stated that the Russian Government is desirous of keeping the matter secret for the present.

At various times we have alluded to the work under way for the Marine Engine & Machine Company of Harrison. We are now informed that E. C. Benedict, well known in financial circles, is the principal stockholder in the company, who have recently undergone reorganization. The company have entered the electric elevator field, having secured a number of ex-employees of the Sprague Elevator Company, including C. R. Pratt, the designer of the Sprague elevator. A large addition is now being built to the works at Harrison, and while considerable of the equipment has already been purchased, orders are still being placed for a considerable quantity of heavy machine tools. Among the machines recently purchased are several heavy Reed and Putnam lathes, Bausch radial drills, Bullard boring mills, Pedrick & Ayer milling machines, Jones & Lawson turret lathes and Gould & Eberhardt gear cutters and shapers. A 30-ton Shaw electric crane has also been purchased. The Berlin Iron Bridge Company are erecting the buildings.

It is announced that the negotiations for the purchase of the Rogers Locomotive Works of Paterson, N. J., are approaching a successful close. Charles R. Flint of the Flint-Eddy & American Trading Company is said to be behind the promoter handling the negotiations.

Appraisements of the plant have been made and it is said that the transaction will be closed to-morrow. It is also stated that the new company intend entering the business of building locomotives on a very extensive scale and will spend considerable money in improving the works. Most of the machinery now constituting the plant is of a rather antiquated nature.

W. C. Kennedy of Chester, Ill., is asking for quotations on an equipment for a new drop forging plant. The machinery includes drop hammers, training presses, coke furnaces, lathes, shapers, die sinking machinery, &c.

R. A. Whiteside of Beaver Falls is inquiring for bids for material and equipment required in the building of an extensive plant at Scranton, Pa., for the Pittsburgh Hardware Mfg. Company. It is estimated that \$50,000 worth of machinery is included in his specifica-

tions. The buildings are to cover about 5 acres and will be of steel frame construction, having steam heat and an electric light plant. The cost of the whole plant will aggregate \$175,000. Mr. Whiteside is the architect who designed the works.

D. G. Ormiston of the Board of Water Commissioners of the city of Rahway, N. J., is asking quotations on two 100 horse-power horizontal tubular boilers.

Manufacturers of machinery for the equipment of beet sugar factories report a good business. One of the largest plants now in course of construction is being built at Lyons, N. Y., by the Empire State Sugar Company. This plant will cost about \$500,000. Orlando F. Thomas of New York is president, William Buchheit of Brooklyn, secretary, and Seymour Scott, treasurer. The special sugar machinery was ordered from the Maschinen Fabrik Grevenbroich, whose New York offices are at 11 Broadway and whose plant is in Germany. This machinery includes the washing machines, beet conveyors and slicers, automatic beet scales, diffusion batteries, heaters, fitter press, mechanical fitters, air pumps, carbonic acid pumps, &c. The centrifugal machines were purchased from the American Machine & Tool Company of Boston. Bartlett, Hayward & Co. of Baltimore, Md., will furnish the evaporators, and the vacuum fans will be supplied by the Otis Company of Philadelphia. Thirty pumps were purchased from the Stillwell, Bierce & Smith-Vail Company of 141 Broadway, N. Y., and the boilers will be furnished by the Erie Iron Works of Erie, Pa. The crystallizer plant was purchased of the Bartlett-Hayward Company, who will manufacture it under license of the patentees, the Maschinen Fabrik Grevenbroich. Other beet sugars who will shortly be in the market for equipments are the North Dakota Beet Sugar Company of Fargo, N. D., and the North Dakota Sugar Company of Jamestown, N. D. Plants of the Marine Sugar Company of Marine City, Mich.; the National Beet Sugar Company of Sugar City, Col., and the Detroit Sugar Company of Detroit, Mich., are now in course of erection. A plant is also to be built at Salzbürg, Mich.

Westinghouse, Church, Kerr & Co. have just closed an order for the largest steam turbine ever built. It will be of 2500 horse-power, and was sold to the Hartford Electric Light Company of Hartford, Conn. The machine will be of the Westinghouse-Parsons type, of which but few have thus far been installed in this country. The Hartford Company also purchased 800 horse-power of Roney mechanical stokers. Among other orders for mechanical stokers which Westinghouse, Church, Kerr & Co. have received are 2000 horse-power for the Chicopee Mfg. Company of Chicopee, Mass.; 1500 horse-power for the Loray Mills of Gastonia, N. C.; 1000 horse-power for the Wilmington, Ill., plant of the Chicago & Alton Railroad; 500 horse-power for the Lukens Iron & Steel Company of Coatesville, Pa., and 1500 horse-power for the Union Depot of Pittsburgh. They also sold heating and ventilating and electric lighting plants to the New York, New Haven & Hartford Railroad, to be installed in the Back Bay, Boston, station. At Gainesville, Ga., they will install a complete electric lighting station of 1000 horse-power.

The following awards were made by the Bureau of Supplies and Accounts, Navy Department, on bids opened September 11. A list of the bids was printed in *The Iron Age* of September 20:

Boston.—Classes 1, 2, 3, 14, 15 and 16, to the lowest bidders; 4, 5, 8, 9, 10, 11 and 12, S. A. Wood Machine Company; 6, Manning, Maxwell & Moore; 7, Niles Tool Works; 17, 18 and 19, Carnegie Steel Company; 13 and 20, no awards.

Mare Island.—Classes 8 and 10, to the lowest bidders; 1, U. Baird Machinery Company; 2 and 6, J. W. Cregar; 3 and 4, Niles Tool Works Company; 5, Prentiss Tool & Supply Company. All other classes not decided.

H. F. Livermore of 59 Beverly street, Boston, Mass., asks whether any one can give him information regarding the utility of compressed air, to be used in an engine instead of steam, and how high a pressure can be used without danger of freezing?

The Aultman & Taylor Machinery Company received the order for the 200 horse-power water tube boiler which is to be installed in the New York Navy Yard. The amount of the contract is \$3849.

Machinery for putting emery on emery paper, paper box making machinery and machinery for making Swedish matches are desired by the Manufacturers' Export Association of 185-187 Dearborn street, Chicago, Ill.

The Rand Drill Company have removed their main office from 100 Broadway, N. Y., to the fifteenth floor of the new building just erected by the American Exchange National Bank, at 128 Broadway, corner of Cedar street. In their new office the company will occupy the entire floor, in conjunction with their allied interests, the Pneumatic Engineering Company, the Rendrock Powder Company and the Davis Calyx Drill Company.

QUOTATIONS OF IRON STOCKS DURING THE WEEK ENDING OCTOBER 17, 1900.

| Cap'l Issued. | | Thursday. | Friday. | Saturday. | Monday. | Tuesday. | Wednesday. | Sales. |
|---------------|--|-----------|---------|-----------|---------|----------|------------|--------|
| \$29,000,000 | Am. Car & Foundry, Common..... | -15½ | 15½-15½ | -15½ | 16 -16½ | 16½-16½ | 16½-16½ | 4,825 |
| 29,000,000 | Am. Car & Fndry, Pref. (7 % Non-Cu.) | | -61 | 61½-61½ | 61½-63 | | -62½ | 2,925 |
| 19,000,000 | Am. Steel Hoop, Common..... | | -19½ | | 19½-20½ | 20 -20½ | 19½-20½ | 4,050 |
| 14,000,000 | Am. Steel Hoop, Pref. (7 % Cu.)..... | | | -67½ | 68 -68½ | | 66½-66½ | 715 |
| 50,000,000 | Am. S. & W., Common..... | 32½-32½ | 32½-33½ | 33 -33½ | 33½-34½ | 33½-34½ | 33½-34½ | 39,965 |
| 40,000,000 | Am. S. & W., Pref. (7 % Cu.)..... | 73 -73½ | 73½-74 | 73½-73½ | 74 -75 | 75 -75½ | 74½-74½ | 6,735 |
| 28,000,000 | Am. Tin Plate, Common, N. Y..... | 31½-31½ | 31½-31½ | -32 | 32 -32½ | 32 -32½ | 32 -32½ | 5,855 |
| 18,325,000 | Am. Tin Plate, Pref., N. Y. (7 % Cu.).. | 82½-83 | 83 -83½ | -83½ | -84 | | -82½ | 1,785 |
| 7,500,000 | Bethlehem Iron..... | | -57 | -57 | | | | 81 |
| 15,000,000 | Bethlehem Steel, Par \$50, \$1 paid in.. | 13½-14½ | 14½-15½ | 15½-15½ | -15½ | -15½ | 15 -15½ | 5,900 |
| 7,974,550 | Cambria Iron, Phila*..... | | -44½ | | 44½-44½ | 44 -44½ | | 99 |
| 16,000,000 | Cambria Steel**..... | 15 -15½ | 15½-16 | 15½-15½ | 15½-15½ | 15½-15½ | 15½-15½ | 13,667 |
| 11,000,000 | Col. Fuel & Iron..... | -33½ | 33½-34 | 33½-34 | 34 -35½ | 35½-36½ | 35½-36½ | 9,470 |
| 46,484,300 | Federal Steel, Common..... | 32½-33½ | 33½-34 | 33½-34½ | 34½-35½ | 34½-35½ | 34½-35½ | 20,735 |
| 53,253,500 | Federal Steel, Pref. (6 % Non-Cu.)..... | 63½-63½ | | 64 -64½ | 64½-65½ | 64½-65½ | -65 | 4,610 |
| 32,000,000 | National Steel, Common, N. Y..... | 26 -26½ | 27 -27½ | -27½ | 27½-28 | 27 -28 | 26½-27½ | 6,913 |
| 27,000,000 | Nat'l Steel, Pref., N. Y. (7 % Cu.)..... | 83½-84 | 83½-84 | | -85 | -85 | -85 | 1,488 |
| 40,000,000 | National Tube, Common, N. Y..... | 46½-47½ | -47½ | 47½-47½ | 47½-48½ | 48½-48½ | -48 | 16,790 |
| 40,000,000 | Nat'l Tube, Pref., N. Y. (7 % Cu.)..... | 92½-93½ | 93½-93½ | 93½-93½ | 93½-94 | -94 | 94 -94½ | 4,528 |
| 5,000,000 | Penna., Common, Philadelphia..... | | -48 | -49½ | 50 -53 | -55 | | 411 |
| 1,500,000 | Penna., Pref., Phila..... | | -80 | -85 | -85 | -85 | | 15 |
| 12,500,000 | Pressed Steel, Common..... | -39 | 39 -39½ | -39½ | 39½-40½ | 39½-40 | 39½-40 | 5,960 |
| 12,500,000 | Pressed Steel, Pref. (7 % Non-Cu.)..... | -75½ | -76½ | 75½-75½ | | -76½ | | 865 |
| 27,191,000 | Republic Iron & Steel, Common..... | 11½-11½ | | -12 | 12½-12½ | 12 -12½ | 11½-12 | 3,670 |
| 20,306,900 | Repub. Iron & Steel, Pref. (7 % Cu.).. | 52½-52½ | | 53 -53½ | 53½-53½ | 53½-54 | 52½-53½ | 3,481 |
| 7,500,000 | Sloss-Sheffield S. & I., Common..... | | | | | | | |
| 6,700,000 | Sloss-Sheffield S. & I., Pref. (7 % Non-Cu.) | | -63 | | | | -63 | 200 |
| 20,000,000 | Tennessee Coal & Iron..... | 55½-55½ | 55½-57½ | 56½-57½ | 58 -59½ | 57½-58½ | 56½-57½ | 23,945 |
| 1,500,000 | Warwick Iron & Steel (par \$10)..... | | 7½-7½ | | | | -7½ | 350 |

* Par \$50. ** \$9 per share paid in. † 6% guaranteed by Beth. Steel Co. Late Philadelphia sales by telegraph. ‡ Ex-dividend.

Bonded indebtedness: Am. S. & W., \$130,656; Am. Tin Plate, none; Am. Steel Hoop, none; Cambria Iron Co., \$2,000,000 6% debenture 30-year bonds, 1917, payable option 5 years, assumed by Cambria Steel Co.; Federal Steel Co., \$9,822,000 Illinois 5%, \$7,417,000 E. J. E. R. R. 5%, \$1,600,000 Johnson 6%, \$6,732,000 D. & I. R. R. 5%, \$1,000,000 2d D. & I. R. R. 6%, \$10,000 land grant D. & I. R. R. 5%; National Steel, \$2,561,000 5%; National Tube, none; Tennessee C. I. & R. Co., \$8,367,000 6%, \$1,114,000 7%, \$1,000,000 7% cu. pref.; Pennsylvania Steel, \$1,000,000 5%, Steelton, 1st, 1917 \$2,000,000 5%; Sparrow's Point, 1st, 1922, \$4,000,000, consolidated, both plants; Bethlehem Iron, \$1,351,000 5% maturing 1907. Interest and principal guaranteed by Bethlehem Steel Co. Republic Iron & Steel, none; Warwick Iron & Steel, none; Colorado Fuel & Iron Co.; Col. Fuel Co. Gen. Mort. 6% \$80,000, Col. Coal & Iron Con. Mort. 6% \$2,810,000, Col. Fuel & Iron Gen. Mort. 5% \$2,303,000. Also outstanding \$2,000,000 preferred stock with accumulated dividends of \$640,000 to June 30, 1899. Sloss-Sheffield St. & I. Co., Sloss I. & S. first mortgage 6%, \$2,000,000, Sloss I. & S. general mortgage 4½% \$1,835,000.

Iron and Industrial Stocks.

The New York market for steel stocks has been moderately active, with an advancing tendency for the Wire Issues, Tin Plate, Steel Hoop and National Tube. In the latter there has been a larger business than usual, encouraged apparently by semiofficial reports of heavy earnings. Philadelphia has seen an unusually active week, notably in Cambria Steel and Bethlehem.

| | Bid | Asked. |
|--|-----|--------|
| American Bicycle Company, common..... | 3½ | 5 |
| American Bicycle Company, preferred..... | | 23 |
| American Bicycle Company, bonds..... | 60 | 72 |
| E. W. Bliss, common..... | | 137½ |
| E. W. Bliss, preferred..... | 125 | |
| Cramp's Shipyard stock..... | 68 | 72 |
| Diamond State Steel..... | 3½ | 3½ |
| Empire I. & S., common..... | 3 | 6 |
| Empire I. & S., preferred..... | 34 | 38 |
| International Silver, common..... | 3½ | 4½ |
| International Pump, common..... | 20 | 21 |
| International Pump, preferred..... | 68½ | 69½ |
| National Enam. & St., common..... | 15 | 20 |
| National Enam. & St., preferred..... | 73 | 78 |
| New Haven..... | 3½ | 3½ |
| Otis Elevator, common..... | 27 | 28 |
| Otis Elevator, preferred..... | 86½ | 87½ |
| Pratt & Whitney, common..... | 3½ | 5 |
| Pratt & Whitney, preferred..... | 45 | 55 |
| Tidewater Steel..... | 7½ | 7½ |
| U. S. Cast Iron Pipe Company, common..... | 3½ | 4 |
| U. S. Cast Iron Pipe Company, preferred..... | 29 | 30½ |
| U. S. Projectile..... | 100 | |
| Va. C. I. & C., stock..... | 3½ | 5 |
| Va. C. I. & C., bonds..... | 30 | 35 |
| H. R. Worthington, preferred..... | | 110 |

The Phoenix Iron Company have declared a quarterly dividend of 1¼ per cent. on the preferred stock, payable October 10.

Dividends.—The Pittsburgh Coal Company of Pittsburgh have declared a dividend of 1¼ per cent. on the preferred stock.

The Manufacturers' Light & Heat Company of Pittsburgh have declared a quarterly dividend of 1½ per cent., payable October 20.

The American Stoker Company of New York have paid a dividend of 2 per cent. on the preferred stock.

The National Tube Company have declared a quarterly dividend on their common stock, payable November 15. Books close October 30.

The Pennsylvania Steel Company, Steelton, Pa., have declared the regular quarterly dividend of 1¼ per cent. on the preferred stock.

Preferred stock of the Crucible Steel Company of America was offered on the Stock Exchange, Pittsburgh, last week at \$75, par value being \$100.

The Supreme Court is sitting in Pittsburgh this week, and in the case of Gilbert T. Rafferty against Chas.

Donnelly and others, to recover \$50,000 alleged to have been voted as salaries to the officers of the McClure Coke Company, of which the plaintiff is a member, the court affirmed the decision of the lower court against Rafferty. The Supreme Court says: "Appellant's history of the case is a flagrant violation of the rules, teeming with extracts from the testimony, and is argumentative, covering 21 pages. Two would have been more than sufficient for a closely condensed statement of all facts necessary. A penalty could have been properly imposed for this dereliction, but it is withheld that the appellant might be heard and no injustice done him."

Machinery Wanted.—A correspondent desires to obtain a list of parties making machinery for the manufacture of tar paper for roofing.

The Philadelphia Machine Tool Company, Philadelphia, Pa., have recently shipped to J. G. Brill & Co. a double milling machine of special design for milling keyways. They have also recently received an order for a chain testing machine, having important features, not in any so far made. In general design, however, it is similar to the 600,000-pound machine now in use in the Boston Navy Yard.

The structural work on the new electric tramway in the city of Glasgow, Scotland, which is being built by the Riter-Conley Mfg. Company of Pittsburgh, is nearly completed, and that concern expect to order their men to return home in a short time. The new line covers a number of the streets in Glasgow, and is built almost exclusively of American steel. All the electric equipment for the line was made by the Westinghouse Electric & Mfg. Company of Pittsburgh.

The traffic of Lake Superior to October 1 has been computed and shows a movement of freight for the five months of almost 20,000,000 tons. This is more than for any complete year prior to 1899. The September movement of freight was 3,411,453 tons, and for the season to date 19,978,475 tons. This increase of traffic for the year has been accomplished with a share of the large freight ships of the lakes tied up at docks at all leading ports.

A press dispatch from Tampico, Mexico, reports destructive floods in the Panuco and Tames valleys in the State of San Luis Potosi, owing to an unprecedented rise in the Panuco and Tames rivers. Hundreds of houses occupied by Mexican farmers and laborers have been swept away, and many lives are said to have been lost.

Trade Publications.

Dry Kilns.—An extensive catalogue of the American Blower Company of Detroit, Mich., treats of their A. B. C. moist air and blower dry kilns. Their moist air dry kiln is of the simplest in design, construction and operation, and is readily applicable to the varying conditions met with in every day work. The temperature is entirely within the control of the operator, and the kiln works as well in winter as in summer, as it is not affected by atmospheric conditions. This statement in regard to temperature is true in regard to the humidity of the air. It can be so saturated as to produce a fog, or the air in the kiln can be kept dry and clear. The circulation course can be varied to suit existing conditions and requirements. It is positive and strong, the air penetrating all the interstices between the boards, carrying off and depositing all moisture rapidly and perfectly. The highest temperature practicable is obtainable with the least expense for fuel. Another feature of particular merit in this kiln is that fine finishing woods, green from the tree, can be dried as rapidly as most of the ordinary kilns with dry air seasoned stock, yet preserving that makes wood valuable for finishing purposes. The value of the kiln is not confined to the drying of hard woods. Its remarkable rapidity in drying soft woods, particularly Southern and sap pines makes it valuable for this work. A two compartment kiln has dried out 36,000 feet per day of green sap pine, evaporating nearly 100,000 pounds of moisture from the same.

Fire Brick.—A pamphlet has been issued by the Buckeye Fire Brick & Clay Company, Scioto Furnace, Ohio, which deals with their fire brick adapted especially for iron, glass, lime and coke industries.

Acetylene Generator.—The Drake automatic Acetylene gas generator, manufactured by the International Heater Company of Utica, N. Y., is described in a pamphlet just received. This generator is stated to be suitable for all places and purposes where light is wanted, from a small cottage, and which can require only a few lights, to a large factory requiring many hundreds of lights. The machine automatically drops measured quantities of lump carbide into a sufficient amount of water to absorb all heat. All the gas is purified through two separate bodies of water, and then through a combination purifier and dryer. The generator has been approved by the National Board of Fire Underwriters.

Cold Storage.—An elaborate catalogue on cold storage has been prepared by the Starr Engineering Company of New York, who are prepared to undertake the installation of power plants of all kinds. This catalogue treats very fully of all the apparatus required for cold storage, and dwells upon the advantages to be derived from the use thereof.

Steam Dock Capstan.—We have received from the Browning Engineering Company of Cleveland, Ohio, a bulletin describing their new steam dock capstan. In designing this capstan particular attention was paid to the securing of ample protection to the mechanism, and at the same time to obtain great compactness of the parts. The construction not only insures protection of the inner mechanism from all injuries and inclement weather, but it permits the use of a smaller and lighter casing, and thus economizes space. Furthermore, the arrangement permits the use of larger and more powerful engines without occupying more space. The apparatus consists of two engines operating a common shaft carrying a worm engaging with a gear mounted on the drum shaft. The design is remarkably simple and compact.

Shaking Grates.—The Dobbie Foundry & Machine Company of Niagara Falls, N. Y., issue a catalogue describing the Niagara shaking grate and the Niagara automatic smoke burner. The former has been designed especially for slack or soft coal screenings, which it burns thoroughly on account of the increased air surface. Owing to the peculiar construction of the simple grate the loss of fuel is obviated. A detachable frame built to the required height and size of the furnace and entirely independent thereof supports the bars, which rest on rockers and fit in grooves at either end. In their normal position these bars present an entirely level surface. A single bar is formed with a comb arising from the body of the bar to $\frac{3}{4}$ of an inch above the surface of the same, through which $\frac{3}{4}$ inch opening from the drop of the bars to the fire a continuous circulation of air is permitted which prevents warping of the bar.

Heavy at the center, tapering to both top and bottom, and thereby presenting a knife edge, the bars form no resistance whatever to the escaping ash and upward flow of air, and a clean fire at all parts of the grate is the immediate result of a slight shaking. The operating parts of the grate are placed at a sufficient distance from the fire not to be affected by heat. Their automatic smoke burner is, as its name implies, self acting. The apparatus is simple in construction, easily applied and without mutilation to the boiler front or furnace, and without in any way altering the previous operations of firing. This burner is guaranteed to consume 95 per cent. of the smoke from bituminous coal. In other words, to produce an almost perfect combustion and to effect a substantial saving in fuel bills.

Machinery Bargains.—The Chicago House Wrecking Company, West Thirty-fifth and Iron streets, Chicago, have just issued their catalogue, No. 110, which gives 176 pages of all kinds of goods and merchandise, both new and second-hand, which have been secured by this company at sheriffs' and receivers' sales, or through such other business transactions as enable them to make attractive prices. Of very prominent interest in this catalogue are the pages devoted to bargains in machinery. The machinery items comprise 25 pages, and embrace a very great variety. The company state that they usually have on hand from 250 to 450 steam, gas and gasoline engines, and a very heavy line of steam pumps, iron and wood working machinery, electrical machinery, saw mill and ice machinery, as well as special machines for various purposes. They have a building exclusively for their machinery department, occupying a ground space 200 x 360 feet, and have put in facilities for rebuilding machinery so that every shipment leaves the plant in absolutely first-class condition. To enumerate the other contents of the catalogue would require the publication of a list of almost every conceivable article in the line of manufactured products, whether for building purposes, house furnishing or personal use.

The Siemens Water Pyrometer.—Charles Engelhard of 41 Cortlandt street, New York, who is in charge of the distributing office for the United States for Siemens Brothers & Co., Limited, of London for their water pyrometer, has issued a pamphlet describing the same. Metallurgists are familiar with the Siemens type, which is now in use in a number of American steel plants.

Concerning the reports that the offices of the Shelby Steel Tube Company are to be removed to Chicago and that a new plant will be erected at Waukegan, Ill., it is officially stated that nothing definite has been decided in these matters.

The Chesapeake & Ohio Railroad is in the market for 600 steel cars, and the order will probably be placed with the Pressed Steel Car Company of Pittsburgh.

The rolling mills in the Pittsburgh district are all in operation at the present time, and with prospects ahead for a good steady run. There continues to be a scarcity of iron skelp, and there is no doubt but that two or three more large skelp mills in the Pittsburgh district could secure plenty of tonnage.

The annual convention of the Structural Iron Workers' Association is to be held in Pittsburgh next week, commencing on Monday. The convention will have about 100 delegates in attendance, but in addition a large number of those interested in this labor organization will be present.

The American Steel & Wire Company are offering for sale some parcels of land and small buildings at their Beaver Falls mills, at Beaver Falls, Pa. The company own at Beaver Falls about 23 acres on which are located a number of buildings, widely separated, and which cannot be utilized to good advantage. The company are not offering the rod mill or nail machines for sale, which are contained in the Beaver Falls mills proper.

The Seattle Iron & Metal Company have been organized at Seattle, Wash., for the purpose of conducting a general business in scrap iron and steel and other old metals. They have a yard at 1007 to 1011 First avenue, south. The president and general manager of the company is Marks Swarts, who was long and favorably known in the same line of business at Chicago.

HARDWARE.

Condition of Trade.

WHILE it is possible that the attention being given to politics detracts something from the volume of business, it is undoubtedly true that the demand continues remarkably good, especially from the retail merchants, whose orders are referred to as aggregating well. In the time which remains between now and the election it is possible that the disturbing influence of the Presidential campaign may be more marked than it has been. The market generally presents no specially important new features. Prices remain fairly well maintained, but the general course is toward lower values. The trade recognize this, and are buying conservatively, but in sufficient quantities to meet their requirements. Jobbers are keeping their stocks to a good working level, and in the main are pretty well supplied with goods. In some cases they have even now considerable stocks of goods purchased before the advances, on some of which it is a question whether the buying in such quantities was justified. The success of the jobbing trade in connection with the recent advance in prices and the way in which they met the break in the market, are indications of the ability with which their business was conducted, and the trade generally are to be congratulated that the decline from abnormal prices has thus far been attended with little disaster or disturbance. The export business of the country continues large and expanding, and American goods much more easily than formerly find a place in foreign markets. The advances made last year have lost some trade, but the policy of many manufacturers to avoid advancing prices to export buyers has made it feasible to hold a good deal of business which would otherwise have been lost. The outlook thus for business both at home and abroad is very promising.

- Chicago.

(By Telegraph.)

The anticipations of a heavy trade in Hardware at the beginning of the month are being realized, all jobbers reporting the volume of business in dollars running ahead of the corresponding month of last year. No disposition is apparent among retailers to stock up, but all orders are for immediate requirements. The usual accompaniment of an order is a request to ship at once. If the shipment is not made on the same day the order is received complaint is made by the buyer. This condition of trade naturally causes embarrassment. The very large business finds jobbers with light stocks, and they are compelled to constantly draw on each other or on the factories. They are thus steadily encountering an apparent condition of scarcity in staple goods. This is a condition which could easily be relieved by placing larger orders with manufacturers, but conservatism is the predominating policy in view of the approaching election. A particularly heavy demand is coming from west of the Mississippi River. That part of the country is exceptionally prosperous, and the consumption of Hardware is on a very large scale. The outlook is of the most encouraging character and a continuance of the present lively demand is looked for if the election is satisfactory to business interests. The Heavy Hardware trade is in excellent condition, also the volume of busi-

ness, this week being even larger than that reported last week. Manufacturing interests drawing their supplies, including seasonable goods, show that the trade did not anticipate fall requirements this year as has usually been their custom.

St. Louis.

The very satisfactory receipts of orders reveal no cause to doubt the good condition of the Hardware trade in general. Dealers are in constant touch with jobbers, and in the majority of cases urge quick deliveries of goods specified. This week uncovers a strong need for Wire Nails and Wire, which both jobbers and retailers are said to be short of. Attention is called to the movement of Loaded Shells. The action in this line is said to be unusually strong, and on some brands it is difficult to have factory fill orders with reasonable promptness. Stamped and Pieced Tinware is in better call, and even at this late day there is interest shown in Preserving Cans. Bucket and Chain Pumps are being freely shipped, as also are Washing Machines. The trade seem to be handling Sewing Machines more heavily than heretofore, as noted among goods on shipping floors. Cotton Rope is said to be checked in sale by prices now named, but on the other hand Sisal Rope is said to be having a larger sale because of the lower prices. Galvanized Sheets, also Black Soft Steel Sheets of Stove Pipe gauges, are having seasonable sale. Last week was notable for the sale of the largest opening stock in this market in several years past. The goods are intended for a Texas point. This is about the period when instructions are issued to salesmen on spring goods. The nearness to election day has led some of the jobbing trade to withhold instruction until after election day, as there may arise conditions demanding modifications. The Heavy Hardware trade say that there seems an improved demand this week. Horse Nails and Shoes are quite active, and although late in the season wood stocks are in good call.

Baltimore.

CARLIN & FULTON.—In spite of the tradition, in fact of the experience, that the year of a Presidential election is a poor one for business, trade this year has been, at least since July, comparatively good. In comparing dates we must remember that the extraordinary demand of 12 months ago was created not entirely by the actual necessities of the consumer, but was unduly forced by a speculative mania which had affected nearly every individual in all trades and professions, walks and stations in life. Undoubtedly the manufacturing interests had the greatest year ever known in their history, but the immense increase in their productions was not attended by a proportionate increase in the outlets for their distribution. The national development of our own country goes on steadily, and the growth of our export trade has been marvelous, but neither nor both have been sufficient to absorb the maximum output of the immense manufacturing interests which had every mine, furnace and mill working to its utmost capacity to satisfy the demand for goods which were in a majority of cases not actually needed, but contracted for in expectation of a rise in values.

After the superhuman efforts of last year in production it could not be expected by the manufacturers that the demand would continue as good, and the retailer is buying and the jobber is distributing very largely the surplus of last year's production which has not been consumed in the daily needs of a large and an industrious people.

We therefore believe that as a general thing trade

has been better this year with the jobber than with the manufacturer, and that this is likely to continue for some little while until stocks are greatly depleted and the stability of market prices assured. That the market is adjusting itself to present conditions is shown by the firmness in Wire and Nails, which have not changed since the radical reductions of last April. In some other goods, which had been abnormally high, concessions have been made which will benefit and stimulate the demand later on.

In a few weeks the election will be over, and after the first few days of disappointed hopes or ambitions on the one hand, or of exultations on the other, the great mass of people will continue in their daily avocations, some at the plow, others at the loom, and the forge, some in the laboratory, others in the counting room, and to provide for the increasing wants of this and other nations Hardware will continue to be made and sold in quantities and at prices which we hope will give prosperity to all.

Boston.

BIGELOW & DOWSE COMPANY.—There is a marked improvement in the volume of business since October 1. While orders are not large they cover a good assortment, showing that retailers' stocks are light. Jobbers are ordering more freely as their stocks are being reduced by good sales.

The New England Iron and Hardware Association are anticipating much pleasure at their monthly dinner on the 18th, when they are to entertain John Bindley, president, and T. James Fernley, secretary-treasurer, of the National Hardware Association. There is being much interest developed in Mr. Bindley's work of having the fixed charges added to the cost of goods at factory, plus freight and draying. It is hoped that some action will be taken by the National Association at its meeting in Richmond the coming month.

Severe storms and heavy rains the past two weeks have damaged roads and bridges, and have wrecked many vessels on the Eastern coast, but the heavy rains have filled the rivers to the joy of the lumberman and the millmen are rejoicing in a plentiful supply of water. There is but little excitement hereabout over the election, and one hears little talk except the various prophecies in the newspapers. There is a growing confidence that the present administration will be continued.

Remittances show some improvement.

Philadelphia.

SUPPLEE HARDWARE COMPANY.—Trade continues without any interruption or diminution as to results since our last favor. From the district affected by the coal strikes no trade has reached our city. At the present writing, however, there is every appearance of this strike being settled at an early date, and the various miners will resume work.

Prices remain without any material change, and so far as present indications are, the trade are looking for little, if any, change before January 1. The mild weather is not conducive to orders for winter goods; therefore it is very remarkable that trade on regular lines of goods holds up to present volume.

Collections are fair.

Louisville.

W. B. BELKNAP & Co.—The market is in a fairly normal condition. Buyers are not looking for bargains, especially as prices seem reasonably adjusted to the recently adopted basis of raw material. The excess price on most commodities has been squeezed out, and slumps or declines of any importance are not looked for any longer.

If buyers could get themselves together as those of a few railroad companies do, to say that the price of Rails, for instance, ought to be \$22, when the manufacturers think that \$26 is bottom, there is no telling what the result might be. It would be very easy to get a deadlock on these terms almost any day. The fact is that trade

is pursuing its natural channels, from which it is extremely hard to divert it. These channels may be rendered more or less devious by artificial dams, or bunkers, if we were to use the lingo of the golf field, but in the end it debouches at about the place that nature intended it should, and those who attempt to interfere have to pay the penalty often of their own folly.

"After the election" seems to be the general time fixed by nearly every one when we shall have a fresh and definite starting point, and shall know better what to do to provide for future wants. The present wants, however, are so considerable that they are employing us meanwhile, and we have something to occupy our time besides subscribing to the campaign fund and listening to speeches.

Despite the provocations and the partisanship of the daily newspapers, feeling has not yet run very high. It may warm up between now and November 6, and probably will, but no one who has a good business is letting it run down because he fears that in either event on that day he will have nothing to do thereafter.

San Francisco.

MILLER, SLOSS & SCOTT.—The condition of the Hardware trade on the Pacific Coast is very satisfactory. The volume of trade up to the present date compares very favorably with last year, although prices are materially reduced from last year's quotations.

The fruit and grain crops have turned out much better than was expected, and nearly all has been sold at good prices. The industries on the coast were never in better condition, all the shops are full of work.

San Francisco is fast becoming a general depot for the transport service, not only for this, but for other nations as well. Germany, more particularly, has been sending a good quantity of supplies from San Francisco, all of which tends to improve the condition of business on the Pacific Coast.

Collections and the money market are much easier than they are usually at this time of the year.

Portland, Oregon.

CORBETT, FAILING & ROBERTSON.—There is but little change to report in the trade situation of this section since our last. Sales hold up well, as compared with corresponding weeks of last year, and the only regret that can be expressed is that we are not making the enormous profits that we did in 1899, owing to fortunate covering in many lines of a year's stock before prices advanced. However, we are thoroughly convinced that these high prices, although we profited by same, are not a good thing for the manufacturer, jobber or consumer. The reaction which is bound to follow is, to say the least, very trying. We are looking forward hopefully to a larger immigration into Oregon and Washington than for many years past. Two transcontinental lines are making very low rates for home seekers, and it is only a question of time before the other roads will be forced to meet the rate. We have every inducement in climate, soil, mining and lumber possibilities to appeal to one that wishes to better his condition in life, and at the same time are located in the Oriental gateway, through which so much is expected in the coming years.

Omaha.

LEE-GLASS-ANDRESEN HARDWARE COMPANY.—Dealers in the Hardware trade throughout this region express themselves as very well pleased with the present trend of business, and find that they are having a much heavier trade now than experienced a year ago. Cooler weather has had a tendency to bring more buyers to market, and mail orders for fall and winter goods are steadily increasing. Stocks in dealers' hands are not large, and what buying is done is designed to cover actual requirements, and is devoid of any appearance of a speculative element.

With the exception of a very few lines the general market has recorded no material changes since our last

report. General conditions are regarded as excellent, labor is well employed and prospects for the continuance of a heavy volume of business are extremely favorable.

Cleveland.

THE W. BINGHAM COMPANY.—Since our last advice trade has continued very satisfactory—that is, for immediate wants. Sales of all seasonable goods have been very good. Shelf Goods have also moved freely, although the line of Builders' Hardware does not show the improvement that the majority of the other lines do. The disposition among manufacturers not to name prices for next spring's delivery on season goods until later, we think a wise move. With the election on hand for this month it would not be possible to do very much on futures. We are pleased to note that this year the Presidential election is not affecting trade perceptibly, but without doubt the remaining two weeks before election will feel it to some extent.

Notes on Prices.

Wire Nails.—The demand for Wire Nails continues to improve, and carload orders are more frequent. Quotations are as follows, f.o.b. Pittsburgh, terms 60 days, or 2 per cent. discount for cash in 10 days:

| | |
|---|--------|
| To jobbers in carload lots..... | \$2.20 |
| To jobbers in less than carload lots..... | 2.25 |
| To retailers in carload lots..... | 2.30 |
| To retailers in less than carload lots..... | 2.40 |

New York.—Frequent orders for small lots of Wire Nails from store is a characteristic of the local market. The situation has been strengthened by an understanding among jobbers to maintain prices. Quotations are as follows:

| | |
|-------------------------------------|--------|
| To retailers, carloads on dock..... | \$2.48 |
| Small lots from store..... | 2.55 |

Chicago, by Telegraph.—Manufacturers of Wire Nails report a steadily increasing trade. Orders are not only numerous, but they are growing larger and in notable instances contracts are being placed which will give jobbers larger stock than they have been carrying for months. This business is coming from all parts of the Chicago territory, but it is particularly heavy west of the Mississippi River. Local jobbers are enjoying a large trade, which is also steadily increasing. Prices are unchanged at \$2.35 for carload lots and the usual advance for small lots.

St. Louis.—The market in Wire Nails has opened quite actively and jobbers have had to send rush orders to mills. It seems a fact that stocks in the hands of the trade are quite limited. Urgency is had on all hands for the prompt movement of Nails ordered. It is evident that a steady, desirable trade is now coming to the front. Prices to retailers for carloads is \$2.40, base; smaller quantities, \$2.45.

Pittsburgh.—We can report a continued active demand for Wire Nails, and in some cases jobbers are having difficulty in getting Nails as fast as wanted. The American Steel & Wire Company have started up several additional mills and are shipping their output of Nails as fast as made. It is not believed there will be any change in price of Nails until after the election at least. We quote, f.o.b. Pittsburgh, terms 60 days, or 2 per cent. discount for cash in 10 days, as follows:

| | |
|---|--------|
| To jobbers in carload lots..... | \$2.20 |
| To jobbers in less than carload lots..... | 2.25 |
| To retailers in carload lots..... | 2.30 |
| To retailers in less than carload lots..... | 2.40 |

Cut Nails.—Small orders for Cut Nails prevail largely, resulting in a fair volume of business. Quotations are as follows, f.o.b. Pittsburgh, terms 60 days, 2 per cent. off in 10 days:

| | |
|---|--------|
| Carload lots..... | \$1.95 |
| To jobbers in less than carload lots..... | 2.00 |
| To retailers in less than carload lots..... | 2.10 |

New York.—The moderate demand for Cut Nails continues. By concerted action the jobbers will endeavor to maintain prices. Quotations are as follows:

| | |
|---|--------|
| To jobbers in carload lots on dock..... | \$2.13 |
| To jobbers in less than carload lots on dock..... | 2.18 |
| To retailers in less than carload lots on dock..... | 2.31 |
| Small lots from store..... | 2.25 |

Chicago, by Telegraph.—The demand for Cut Nails is keeping up its recently acquired excellent reputation. A much better business is doing in this line than had been expected. Small lots from stock are quoted by jobbers at \$2.25.

St. Louis.—Iron Shingle Nails are a feature of the trade, and specifications for other sizes of Cut Nails are of about usual volume. Price out of stock is \$2.30 to \$2.40, base.

Pittsburgh.—Demand for Cut Nails is getting better, trade for September being reported in excess of that for August. There is no disposition on the part of the trade to anticipate requirements in Cut Nails, the belief being that prices will not be any higher, but, on the contrary, may be reduced. We quote, f.o.b. Pittsburgh, terms 60 days, 2 per cent. off in 10 days, as follows: Carload lots, \$1.95; jobbers, less than carload lots, \$2.

Barb Wire.—There is little doing in Barb Wire, demand being very light. Quotations remain unchanged as follows, f.o.b. Pittsburgh, net cash 60 days, or 2 per cent. discount for cash in 10 days:

| | |
|---|--------|
| To jobbers in carload lots, Painted..... | \$2.50 |
| To jobbers in carload lots, Galvanized..... | 2.80 |
| To jobbers in less than carload lots, Painted..... | 2.55 |
| To jobbers in less than carload lots, Galvanized..... | 2.85 |
| To retailers in carload lots, Painted..... | 2.60 |
| To retailers in carload lots, Galvanized..... | 2.90 |
| To retailers in less than carload lots, Painted..... | 2.70 |
| To retailers in less than carload lots, Galvanized..... | 3.00 |

Ellwood & Baker Wire is 5 cents and Washburn & Moen Glidden 10 cents per 100 higher than the foregoing prices.

Chicago, by Telegraph.—The increased orders for Barb Wire now being received by manufacturers are proportionate to the increase in the demand for Wire Nails. While the trade in this immediate vicinity has abated to some extent, other sections are buying much more largely. This branch of trade is not expected to be as heavy as in former years, on account of the inroads made by Woven Wire Fencing, the demand for which is also excellent. Prices are quoted at \$2.70 for Painted and \$3 for Galvanized Barb Wire, in small lots, Chicago delivery, with the usual reduction on carload lots.

St. Louis.—Sales continue surprisingly good, the lateness of season being considered. There is said to be difficulty in having orders filled. Painted in carloads to retailers is \$2.70; smaller lots, \$2.75. Galvanized is 30 cents higher.

Pittsburgh.—There is a fair amount of business in Barb Wire, but with the breaking up of the weather it will probably fall off considerably. We quote as follows: Galvanized Barb Wire, \$2.80, in carload lots to jobbers, and Painted, \$2.50. Terms, 60 days net, 2 per cent. discount for cash in 10 days, f.o.b. Pittsburgh.

Plain Wire.—Plain Wire is moving more freely, requirements covering a variety of sizes. Quotations are as follows, f.o.b. Pittsburgh, terms 60 days, or 2 per cent. off for cash in 10 days:

| | Base sizes. | |
|---|-------------|--------|
| | Plain. | Galv. |
| To jobbers in carload lots..... | \$2.15 | \$2.55 |
| To jobbers in less than carload lots..... | 2.20 | 2.60 |
| To retailers in carload lots..... | 2.25 | 2.65 |
| To retailers in less than carload lots..... | 2.35 | 2.75 |

The above prices are for the base numbers, 6 to 9. The other numbers of Plain and Galvanized Wire take the advances indicated in the following table:

Plain Fence Wire Advances (Catch Weights).

| Nos. | Base. | Galvanized. |
|-----------------|---------------------------|---------------|
| 6 to 9..... | \$0.05 advance over base. | \$0.40 extra. |
| 10..... | .10 | .40 |
| 11..... | .15 | .40 |
| 12 and 12½..... | .25 | .40 |
| 13..... | .35 | .40 |
| 14..... | .45 | .75 |
| 15..... | .55 | .75 |
| 16..... | .70 | 1.00 |
| 17..... | .85 | 1.00 |
| 18..... | | |

For even weight bundles, 50 pounds and over, 5 cents per bundle advance on above.

Chicago, by Telegraph.—A larger movement is reported in Plain Wire by both manufacturers and jobbers. The consumption by all kinds of manufacturers of Wire products is increasing and trade is very satisfactory. Small lots, Chicago delivery, are quoted at \$2.35, base.

Pittsburgh.—There is a moderate volume of business in Plain Wire, but orders are mostly for small lots. There is no indication of any change in prices. We quote:

| | Plain. |
|---|--------|
| To jobbers in carload lots..... | \$2.15 |
| To jobbers in less than carload lots..... | 2.20 |
| To retailers in carload lots..... | 2.25 |
| To retailers in less than carload lots..... | 2.35 |

Galvanized Wire up to No. 14 is 40 cents advance on Plain, Nos. 15 and 16, 75 cents advance, and Nos. 17 and 18, \$1 advance. Terms are 60 days net, with 2 per cent. discount allowed for cash if paid in 10 days from date of invoice.

Axles.—The market in Axles continues somewhat demoralized, and quotations are current, which are referred to by the manufacturers as so low as to entail a positive loss in the sale of the goods. There is more or less unevenness in current quotations, some of the manufacturers refusing to meet extremely low prices made by their competitors. Thus there is considerable divergence in the discounts made on Half Patent Axles, which have in some cases been quoted as low as 80 per cent., but are more generally represented by the quotation of 75 and 10 per cent., or 75, 10 and 5 per cent. Some manufacturers, however, are unwilling to meet even these figures, and are asking 75 per cent. discount. As representing the market in a general way, we give the following quotations, 2 per cent. off for cash in 10 days:

| | |
|-------------------------------|-------------------|
| Concord Loose Collar..... | 4½c. |
| Concord Solid Collar..... | 5c. |
| No. 1 Common..... | 3 to 3½c. |
| No. 1½ Common, New Style..... | 3½ to 4c. |
| No. 2 Solid Collar..... | 3¾ to 4c. |
| No. 7-8, 11 to 14..... | 75 and 10 and 5 % |
| No. 15 to 18..... | 60 and 10 % |
| No. 19 to 22..... | 75 to 80 % |

Scythes.—The manufacturers of Scythes, who have, to a good extent, controlled the market during the year, have recently bought out other outside manufacturers, so that their control of the situation is even more complete than it has been. At the present time there are indeed no important manufacturers outside the pool. Since their organization they have presented sufficient inducements to a number of parties who engaged in the manufacture of this line of goods, or had made arrangements to do so, to persuade them to relinquish the project and leave the association untroubled by their competition. The trade during the year have purchased Scythes only sparingly, as there has been a very general feeling that the prices asked were exorbitant, and the same feeling is having its influence at the present time. The indications, however, point to a larger sale of Scythes this year than last, inasmuch as comparatively few goods have been carried over to next season. The jobbers do not feel assured, however, that prices will be maintained, in view of the opposition of the retail merchants, who protest against the high cost of the goods, and the disposition of the farmers to refrain from purchasing if possible. The market is also affected by the fact that the manufacture of Scythes is an easy business to engage in, and there are indications already that competition may arise. Manufacturers connected with the association refer to the high prices as justified by the unprofitable business of former years, and the expenses of the pool, especially those which have been entailed by the purchase of competing concerns and the payments which are being made to parties to keep them out of the market.

Wire Picture Cord.—There appears to be a lack of entire agreement among the manufacturers of Wire

Picture Cord in regard to the adoption of the list which we published in our last issue. While this list was adopted at a meeting of the manufacturers October 2, we are advised that it has not been adopted by the Andrew B. Hendryx Company, who are adhering to the old list, and state that they are not members of the association. We understand that one or two other manufacturers have not yet announced their adoption of the new list. It therefore remains to be seen what the outcome may be.

Glass.—The Glass factories of the combined and independent manufacturers are making Glass in quantities which it is expected will soon supply the demand. It is anticipated that requirements are not likely to be excessive throughout the fall season. Local jobbers report trade quiet, and state that prices are made from both the manufacturers' list and the one recently adopted by the jobbers' association, according to the preference of the buyer. Discounts which apply to the jobbers' Glass list of September 1, 1900, are as follows: First three brackets, single strength, 85 and 20 per cent.; all other brackets, both single and double, 90 per cent.

Paints and Colors.—*Leads.*—There is little new business being done in White Lead in Oil. As the close of the painting season approaches jobbers are ordering forward contracts in a limited way. The unsettled condition of the Linseed Oil market offers no particular inducements for anticipating requirements for next year. Quotations are as follows: In lots of 500 pounds and over, 6¼ cents; in lots of less than 500 pounds, 6¾ cents per pound.

Oils.—*Linseed Oil.*—On October 11 city crushers advanced prices of Linseed Oil 2 cents per gallon, making Raw Oil in lots of five barrels or more 63 cents per gallon and lots of less than five barrels 64 cents. State and Western brands were also advanced to 62 cents per gallon. These advances were in sympathy with an increase in the price of Flax Seed. Under these conditions buyers are reluctant about placing orders and crushers are not anxious to sell.

Spirits Turpentine.—During the past week the price of Turpentine has advanced 1 cent per gallon, and is now quoted 41½ cents for Southern and 42 cents for machine made barrels. The market is firm, with light demand from large consumers.

Michigan Retail Hardware Dealers' Association.

Michigan Retail Hardware Dealers' Association have recently issued an interesting little pamphlet, in which the constitution and by-laws of the association are given, together with preamble and resolutions adopted at their last annual convention in July. The following address to Michigan Hardware dealers is made:

If not already a member of our organization we invite your attention to the following facts which should interest you. We have to-day nearly 300 of the largest retail hardware dealers in the State.

We could, if needed, command the combined force of 3000 of the best dealers in Michigan, Indiana, Illinois, Iowa, Missouri, Kansas and North Dakota, to help us settle our complaints, through our affiliation with the Interstate Retail Hardware Dealers' Association. We can and do stop wholesalers and manufacturers from selling your customers and thereby depriving you of your legitimate profit. But we cannot continue to do these things unless we grow and develop each year. Is not \$4 (\$3 for the State and \$1 for the Interstate) a mere trifle when the benefits are considered?

If not a member, sign inclosed blank application and send to Fred H. Cozzens, secretary, Trade Building, 61 Congress street, Detroit, and give us your hearty and loyal co-operation in every way.

McCready & Co., Ashland, Ohio, have removed their Buggy and Farm Implement stock to new quarters, a building 150 x 50 feet, two stories high. Their wholesale and retail stock of Hardware is carried in another building of about the same size at the corner of Main and Second streets.

Kentucky Retail Hardware and Stove Dealers' Association.

BRIEF reference has been made to the meeting at Louisville on the 26th and 27th ult., when the Kentucky Retail Hardware and Stove Dealers' Association was formally organized, and we now have the pleasure of presenting portraits of the officers of this, the youngest State Hardware association in the country. These gentlemen, who will serve until the next annual meeting, to be held in February next, are as follows: Geo. Dehler, Jr., Louisville, president; J. S. Ogden, Ashland,



GEO. DEHLER, Jr., President

first vice-president; Charles D. Winn, Paris, second vice-president; Paul Wagner, Louisville, secretary; Wm. Dehler, Louisville, assistant secretary, and Henry Heick, Louisville, treasurer.

The meeting, while not as large as hoped for, about 40 merchants being present, was nevertheless a most enthusiastic one, and all present expressed themselves as amply repaid for having participated in the different sessions.

The meeting was called to order by temporary chairman Paul Wagner, president of the Louisville Retail Hardware and Stove Dealers' Association, who were instrumental in bringing up the project of a State organization; Samuel Korb, secretary of the Louisville Association, acting as temporary secretary. Mr. Wagner made the following address of welcome:

Allow me in behalf of the Louisville Retail Hardware and Stove Dealers' Association to extend to you one and all who have assembled here to-day a cordial greeting and a Kentucky welcome.

Friendship and Fraternity.

We hope to derive a great benefit from having come in contact with one another, and feel that by getting together and exchanging our ideas on the different subjects that may come up for our consideration we cannot fail to accomplish much that will be of great benefit to us as individuals and as an association. While we may not accomplish all that we hope for, yet if there were no other result to look forward to than the friendship made, we would all be amply repaid for our presence here to-day. For are not the retail Hardwaremen a most progressive, active and reliable class of business men, proven so by the few failures in and their attentiveness to business? A class of men who are studying their own interests in a business way? This associating with

the best class of business men in our State is of itself full of pleasure and profit, it is elevating and educating and not soon forgotten.

Co-operation.

This knowing ourselves is but the first step toward executing that for which we have come here to-day. The next and most important step to pursue to gain our ends is co-operation. It is not my intention at this time to point out all our rightful grievances, nor have I the ability to prescribe the remedies for such wrongs as are being perpetrated against us day by day. I shall only touch upon some of these injuries as they come to my mind in order to start the ball rolling, as it were.

Grievances.

We need the honest, united efforts of the Hardwaremen to resist all wrongs perpetrated against them,

First, by catalogue houses and department stores directly.

Second, by manufacturers and jobbers who sell them indirectly.

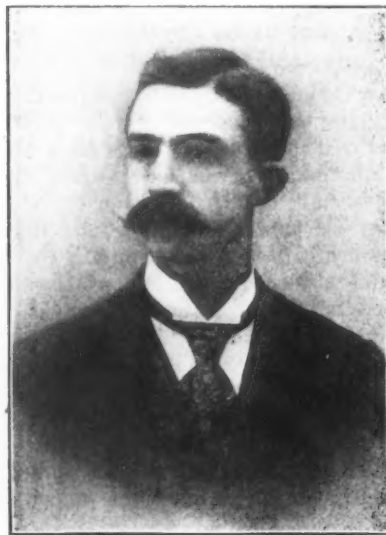
Third, by the peddlers who haunt our streets and residences with or without license.

Fourth, by such dealers in other branches of business as use our line of goods as premiums to secure exorbitant profits on their own goods, or who sell Hardware at or below cost in order to dispose of their own wares at an advantage to themselves, to our detriment, and

Last, but not least, by the jobbers who send their representatives to our towns, soliciting our support, and then go to our customers and ask them for their support, which rightly and justly belongs to the retailer.

I take it that every man in this State who is in the Hardware business is in the business for the same purpose that I am: to make an honest living for my wife and children. I ask, then, is it right that the trade which justly belongs to us be taken from us by the methods mentioned above?

I do not believe in asking for anything that is not



J. S. OGDEN, First Vice-President.

right and businesslike; nevertheless I do believe there is not a man in this room who does not think he is entitled to an honest profit on the ware he sells.

Cutting Prices.

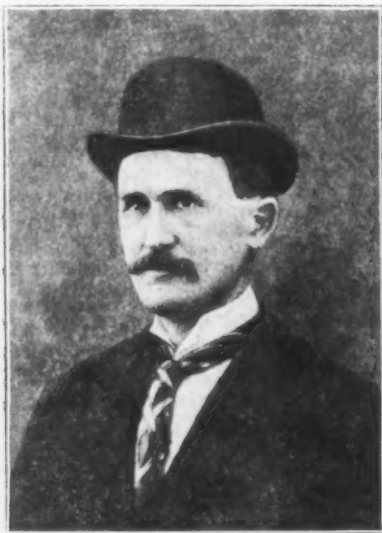
Again, there are dealers who think they cannot win any trade except by cutting prices and committing low, unprincipled tricks. These have few friends, seldom succeed and are always trying to keep honest and legiti-

mate dealers back. In this latter work they are too often successful.

Now I do not believe that any one man here can accomplish that for which we are all striving. But I do believe that by forming a State association much good can be accomplished, and I further believe that by co-operating with other States in a national association we can get all that justly and honestly belongs to us.

In Order to Form a State Association

we must all put our shoulders to the wheel in an earnest effort, and with a determination to succeed. We must lay aside all petty jealousies and become friends. Are we not all striving for the same goal? Why then busy



CHAS. D. WINN, Second Vice President.

ourselves holding others down, thereby causing both ourselves and our supposed enemy to be kept back in our righteous purpose, while the real enemy takes advantage of our differences, and often succeeds in reaching the pinnacle for which we have so long been striving and which rightly belongs to us?

Let Us Be Loyal

to those from whom we expect loyalty. Let us use our influence as individuals and as associates with jobbers and manufacturers to co-operate with us in stamping out the small as well as the great wrongs from which our business is suffering. We can only expect their assistance when we have apprised them of the wrongs of which they may be ignorant, and I predict that if we make ourselves heard in this way many of the wrongs now existing and which may in the future crop out will be speedily and effectually adjusted. Be sure you're right, then go ahead. If we would expect justice from our jobber we should be just to him. If you have a grievance have your proofs conclusive, lay the matter before him in a businesslike way, and it's dollars to doughnuts you will receive just dues.

Should after all honest, reasonable and legitimate efforts on your part you fail to make the proper connections, why

"There Are Others."

Drop him as you would a viper. Tell him plainly you will have nothing more to do with him, and do it. Let your neighbor know you are doing it, and tell him why.

Buy from some other jobber (there are plenty), who will sell you at the same prices and gladly. That retailer who must buy from a certain one jobber deserves no sympathy, and the sooner he closes shop the better for all concerned.

In conclusion, gentlemen, let me impress upon your mind the most beautiful and truthful motto of our State: "United we stand, divided we fall."

THE AGREEMENT.

The following agreement was signed by the merchants present:

We, the undersigned, retail Hardware and Stove dealers, doing business in the State of Kentucky, hereby agree to become members of the Kentucky Retail Hardware and Stove Dealers' Association, and abide by its constitution and by-laws as adopted by a majority of its members present.

Wm. Lewis of New Albany, Ind., who was present by special invitation, addressed the meeting upon the subject of State association work, and also rendered valuable service in assisting the committee appointed to prepare constitution and by-laws.

CONSTITUTION AND BY-LAWS.

The following constitution and by-laws, reported by a committee comprising Charles D. Winn, Paris; J. S. Ogden, Ashland, and Wm. Hinkle, Wm. Dehler and J. H. Murphy of Louisville, were adopted:

Constitution.

ARTICLE I. NAME AND OBJECT.

Section 1. The name of this organization shall be the Kentucky Retail Hardware and Stove Dealers' Association.

Sec. 2. The object of this association shall be the mutual benefit of the retail Hardware dealers of Kentucky, by promoting their interests and securing their friendly co-operation.

ARTICLE II. QUALIFICATION FOR MEMBERSHIP.

Section 1. Any person, firm or corporation engaged in the retail Hardware business, and so recognized, may become a member of this association by subscribing to the constitution and paying membership fee and the annual dues prescribed by the by-laws.

Sec. 2. All Hardware traveling men traveling in Kentucky are eligible as honorary members of this association on payment of \$4 dues annually.

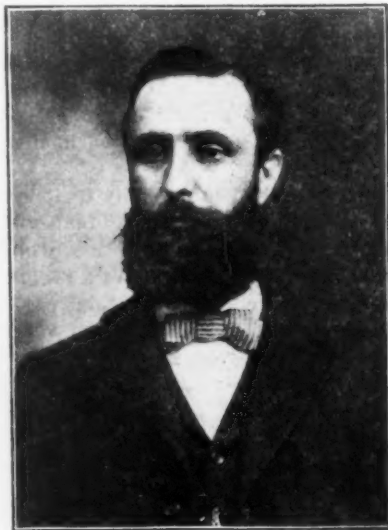
ARTICLE III. OFFICERS.

Section 1. The officers of this association shall consist of a president, two vice-presidents, a secretary and a treasurer. These officers shall constitute the Executive Committee.

ARTICLE IV. ELECTION AND DUTIES OF OFFICERS.

Section 1. All officers shall be elected by ballot.

Sec. 2. The president, two vice-presidents, secretary and treasurer shall be elected at the regular annual meeting.



PAUL WAGNER, Secretary.

Sec. 3. All officers are to hold office until their successors are elected or appointed.

Sec. 4. In case of vacancy of any of the offices of the association the same shall be filled until the next annual meeting by appointment by the president, to be approved by the Executive Committee.

Sec. 5. It shall be the duty of the president, or in case of his absence, of the first or second vice-president, to preside over all meetings of the association, to exercise supervisory control over the affairs of the association and to enforce all measures adopted to improve the retail Hardware business of Kentucky, and to preside at all meetings of the Executive Committee.

Sec. 6. The secretary shall keep a record of all the meetings of the association and of the Executive Committee, and perform such other duties as may be required of him, and he

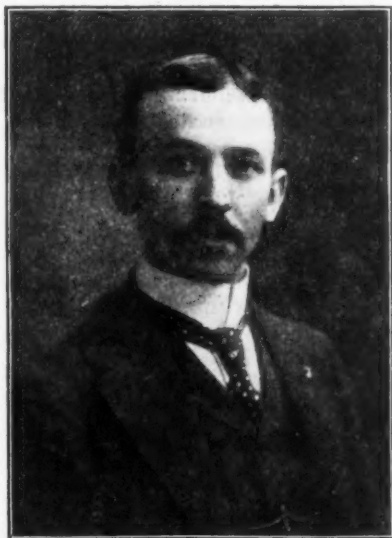
shall be under the direction of the Executive Committee. For these duties the secretary shall receive a salary, which shall be fixed at every regular meeting of the association.

Sec. 7. The treasurer shall receive from the secretary all funds collected by the association and disburse the same under the direction of the association or Executive Committee through a voucher signed by the president and secretary. He shall be required to give bond to the association, as required by the Executive Committee. The fee of the bond company shall be paid by the association.

Sec. 8. The Executive Committee shall perform the duties of an Auditing Committee and examine the books of the secretary and treasurer and report their condition at the annual meetings of the association. They shall have general supervision of the affairs of the association.

ARTICLE V. SERGEANT-AT-ARMS.

Section 1. The president shall appoint at each meeting of the association a sergeant-at-arms, and if necessary, an assistant sergeant-at-arms, whose duties shall be to see that



WILLIAM DEHLER, Assistant Secretary.

no one but members of the association be admitted to the meetings of the association except by order of the presiding officer.

ARTICLE VI. AMENDMENTS.

Section 1. Amendments to the constitution and by-laws may be made at any regular meeting of the association by a two-thirds vote of the members present.

Thirty days' written notice of any contemplated change shall be furnished each person, firm or corporation of the association.

By-Laws.

ARTICLE I.

Section 1. The president, together with the Executive Committee, may call special meetings when they deem necessary. Thirty days' notice of such meetings shall be given the members of the association.

Sec. 2. The Executive Committee shall be subject to call by the president of the association.

Sec. 3. The admission fee to membership shall be \$4, payable in advance, which fee shall cover all dues for the first year.

Each person, firm or corporation shall pay for the current expense thereafter \$4 annually, which shall be the dues, payable at the regular yearly meeting of the association, and of which dues \$1 shall go to the Interstate Retail Hardware Dealers' Association.

Sec. 4. Any person, firm or corporation failing to pay all dues within 60 days from the annual meeting, at which time they become due, and having been duly notified by the secretary, shall forfeit all membership and rights in this association without further notice.

Sec. 5. The expense of the Executive Committee at special meetings shall be paid by the association.

Sec. 6. Each person, firm or corporation shall have but one vote at any meeting of the association.

Sec. 7. No honorary member shall be allowed to vote at any meeting of the association, nor hold any office.

Sec. 8. The regular meetings of the association shall be held annually for two days, commencing on the second Tuesday of February of each year, at such place as may be designated by the association at the previous annual meeting, which place shall be determined by a majority vote of all members present; vote to be taken by ballot.

Sec. 9. The first session of the association meetings shall be an open one. All sessions thereafter shall be executive.

QUORUM.

Section 10. A majority of the members of the association in attendance shall constitute a quorum for the transaction of business.

RESOLUTIONS.

The following resolutions proposed by Mr. Korb were adopted:

Whereas, The Kentucky Retail Hardware and Stove Dealers' Association has been organized to promote the welfare of its members, and especially to protect its members against competition by manufacturers, jobbers and wholesale dealers who sell at retail and deprive the retail dealers of such business which they alone should control, be it hereby

Resolved, That this association protest against such methods of doing business on the part of any manufacturer, jobber or wholesale dealer.

It shall not be the sense of the foregoing resolution to protest against manufacturers, jobbers or wholesale dealers selling to the United States Government, to railroad companies, foundries, machine shops or to manufacturers, such merchandise as may be needed to complete articles of their manufacture and which is sold in connection with same. Be it further

Resolved, That the Executive Committee shall have prepared a list of manufacturers, jobbers and wholesale dealers in Hardware, Stoves and such goods as are generally sold in connection with same and doing business with the retail dealers in the State of Kentucky.

Duplicate copies of the foregoing list shall be made, and one be furnished to each member of the association.

For reasons hereinafter mentioned the Executive Committee shall have full power to remove from or add to the original list mentioned in this resolution such names as in their estimation may seem proper, provided that no change shall be made until 60 days have elapsed since the adoption of this resolution and during that time all manufacturers, jobbers and wholesale dealers mentioned in this resolution shall be considered in good standing with the association. If after the expiration of 60 days herein mentioned the Executive Committee shall find after thorough investigation that any such manufacturers, jobbers or wholesale dealers by reason of selling at retail are not in good standing the said committee shall remove their name or names from said original list.

They shall have power to replace such names removed whenever they shall believe to the best of their knowledge that such manufacturers, jobbers or wholesale dealers have ceased retailing.

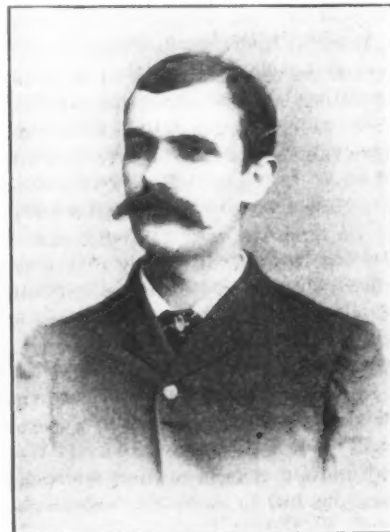
If for reasons herein mentioned the Executive Committee shall remove any name or names from such original list, they should furnish to the members copies of the original list, not including these names which have by them been removed and including such new names which they believe should be placed thereon. Be it further

Resolved, That the Executive Committee shall receive such information of a reliable nature from any member which will expose such manufacturers, jobbers or wholesale dealers who sell at retail directly or indirectly.

Proof shall be demanded when necessary from members giving such information.

Duties of Members Under Foregoing Resolutions.

Resolved, That it shall be the duty of the members of this association to patronize only those manufacturers, jobbers



HENRY HEICK, Treasurer.

and wholesale dealers who are in good standing with the association or others of whom they have no record.

Resolved, That it shall be the duty of members to carefully preserve the list of names of manufacturers, jobbers or wholesale dealers with which they have been provided and add to or remove from same such name or names as may be or may not be on the lists following which they may receive, thus keeping a complete record of manufacturers, jobbers or wholesale dealers who are in good standing and those who are not in good standing.

Resolved, That it shall be the duty of members having knowledge of any manufacturers, jobbers or wholesale dealers making retail sales to make the matter known in writing properly signed to the secretary, and mentioning date of

sale, where and to whom sold, character of goods sold and amount of sale, if known.

Resolved, That copies of these resolutions be printed and distributed to the members of this association.

New England Hardware Dealers' Association.

The regular monthly meeting of the New England Hardware Dealers' Association was held at the United States Hotel, Boston, Wednesday, October 10, at 5 o'clock. There was a large attendance of members and friends, and after dinner the company was addressed by Hon. Willard Howland of Chelsea, who spoke at some length upon "Industries of this Country." At the conclusion of Mr. Howland's address a vote of thanks, proposed by A. S. Morss, was given.

At the business meeting conducted by President George W. Burditt a letter from Henry R. Towne, president of Yale & Towne Mfg. Company, in reply to the recent communication of the association in regard to manufacturers selling direct to builders and consumers, was read by Secretary Farless and tabled without comment. President Burditt stated that the committee having the subject in charge were not yet ready to report.

Before every plate at the table the following circular letter addressed to the members was found:

BOSTON, MASS., September 26, 1900.

Gentlemen: The New England Hardware Dealers' Association was founded in 1893, and up to the present time has been useful in many ways in the advancement of the interests of the trade. At our meetings, which are held in Boston nine times a year, Trade Topics are fully discussed and any suggestions of improved methods of business are adopted. It is the desire of this association that local branches may be formed in all the cities and towns in New England with a representative in this association. Will you aid us by forming such a branch in your location? Respectfully yours,

GEORGE W. BURDITT, President,

JAMES A. FARLESS, Secretary.

There were also sample sheets showing the line of advertising cuts designed for retail Hardware dealers by *The Iron Age*. These latter were distributed at the request of President Burditt, who later called attention to them, and started a general discussion in regard to retail Hardware advertising methods which was participated in by Messrs. Richardson, Nichols, Pierce and Thompson, and it developed that the majority of the speakers gave little attention to their local advertising, though most of them paid out money for it. Ex-President Thompson related his experience in the use of local papers, which he said had been very successful, and although the discussion was brief it appeared to be quite profitable.

In closing President Burditt requested members to bring to the next meeting samples of their advertising matter, at which time it is hoped the subject will be more thoroughly discussed.

During the evening Robert L. Van Buskirk, accompanied by Miss Madge Parks, furnished some very acceptable musical selections.

For the annual ladies' night on the second Wednesday in December the following committee were appointed to make arrangements: E. J. Neale, Lowell; A. H. Decatur, Boston; H. W. Colton, Boston. The committee for the November meeting are C. M. Nichols, Dorchester; William E. Whitney, Somerville; Charles H. Stevens, Arlington.

Stanley Rule & Level Company.

A special meeting of the Board of Directors of the Stanley Rule & Level Company, New Britain, Conn., held on the 8th inst., the following officers were elected: C. E. Mitchell, president; C. B. Stanley, treasurer, and A. W. Stanley, secretary.

The Seguin Hardware Company, Seguin, Texas, have been incorporated with a capital stock of \$20,000.

Australian Correspondence.

THE condition of things in the Hardware trade during the past month or two has not called for any special comment.

The general ironmongery trade has been in a very flourishing condition, with prices well maintained. Some of the leading houses here characterize the current year as the best for ten years past.

The official trade and revenue returns of the different colonies amply justify the belief, and it is a positive joy to note in the different cities and towns the expansion of the various trading concerns. New premises are going up right and left, old ones being renovated.

The United States of Australia.

The United States of Australia come into being within a few months, the first Governor-General (Lord Hopton, one of the most popular State Governors this colony of Victoria ever had), sailing from London about the time this letter reaches New York.

The Federal tariff will be the first subject tackled by the Senate, and it is confidently expected that it will be in force by June 1, 1901.

Sydney merchants are already stocking heavily at their free port, and politicians are even now busy grinding their little free trade and protective axes.

Trade Lines.

AXES AND SAWS.—American Axes and Saws are still "going strong," the advertisement they gained at the Axemen's Competitions in November last having been of material assistance in enabling them to maintain their prestige.

TIN PLATES.—Tin Plates are selling very freely in anticipation of the coming preserving season being exceptionally good.

PRESERVING CANS.—Since Australia's trade in preserving meats and fruits for export will in the near future form one of her staple industries, it would be well for your Tin Plate manufacturers to watch the development of the business and study the seasons if they wish to share in the spoils.

TUBING AND BEDSTEADS.—Apropos of "trade items," it is very refreshing to note, if only as a coincidence, the increased attention given to Australian trade in lines indicated in *The Iron Age*, immediately after publication. This has been notably the case the last few months in Tubes and Bedsteads. The trade is here, and can be done with your country. Unfortunately, in the latter line, Bedsteads, your agents commenced to hustle just too late for the season. Firms here are booked up for the rest of the current year, and no orders are likely to be placed till after the end of 1900.

American Business.

And while on this subject of American business, let me write, in capital letters, that American business here, to be enduring, must be on a solid basis. Your prices fluctuate too much under existing conditions to give that feeling of safety and permanence which dealers require.

SHOVELS.—The writer has in mind a good line of American Shovels offered here a few months back, but before a trade could be worked up a cabled advance in prices ran the goods off the market by sending them higher than the English article. No increased cost of production was known here to warrant the advance, and English prices were not increased at the time in anything like proportion. The agent here could, therefore, only lie low and hope that every one would forget he had been negotiating with them to handle American Shovels.

IMPRESSIONS.—Actions like these tend to justify the often expressed idea that America is only working off her surplus manufactures on the Australian market, and that her own protective duties enable her to spasmodically cut under regular prices without permanently benefit-

ing any one, finding her own true market in her own country.

A REMEDY.—How these impressions can be removed must be quite as clear to your manufacturers as to the Australian trader. It is simply necessary to put quotations on a more permanent basis to secure permanence of trade.

AMERICAN FURNITURE.—Some landed samples of high class cabinet work have recently been shown to your correspondent. The finish, packing and price are things to marvel at, and a good trade should be done in better class work such as doctors' and dentists' cabinets. Local competition is simply "not in it."

BUILDERS' AND SHELF HARDWARE.—A range of samples just landed here from a well-known American manufacturing concern are things of beauty, indeed, and it is questionable if Australia has ever seen anything to equal them. They should come to stay.

SHEEP SHEARS.—Does America do anything in this trade. If not, why not?

Hardware Assistants' Associations

are growing out here, and flourishing. The Melbourne Association, which has the cordial support of the employers, has just published its annual report, showing itself about £300 to the good. As a means of promoting harmony and good fellowship, securing positions for members out of work, and promoting the moral and social welfare of assistants, it is difficult to overestimate its value.

Hardware Club.

At a meeting of the Board of Governors of the Hardware Club, October 15, the following new members were added to the rolls:

J. W. Cleveland, Paterson, N. J.

Melville E. Stone, 195 Broadway, New York.

John A. Straley, 256 Broadway, New York.

Lou D. Sweet, Franklin, Pa.

Chas. H. Tibbits, International Silver Company, Wallingford, Conn.

A fire started in the kitchen and preparing room of the club on the night of the 16th inst., doing considerable damage to this part of the club, also extending to the storeroom, where wines, linen, silver and other goods were stored. The principal damage to the apartments on the main floor of the club is confined to water and smoke, but it is feared the recent decorations and some of the paintings have been damaged.

Requests for Catalogues, &c.

C. H. CASEY, Hardware merchant, Jordan, Minn., has commenced the foundation of a new store building, 35 x 110 feet, with basement under the entire building. The structure will be of brick, two stories high, and will front on two streets, with modern plate glass fronts. It is expected that the foundation will be completed within 30 days, and the remainder of the work will be taken up as early next spring as possible, so as to have the building ready for occupation by June 1, 1901. This will be connected with a warehouse, 24 x 60 feet, already built, and will largely increase his present capacity. Mr. Casey handles Hardware, Stoves, Agricultural Implements, Wagons and Buggies, Sporting Goods, &c., and advises us that he would be pleased to receive catalogues and prices on Steel Ceilings, Cornices, Roofing, Store Fronts, Elevators, Heating Apparatus, &c.

Frank F. Bael, who has lately succeeded the Trenton Hardware Company, Trenton, N. J., advises us that he would be pleased to hear from manufacturers with copies of catalogues and jobbers' quotations.

D. K. McRae, formerly in the Hardware business at Angleton, Texas, has removed to Florence, Col., where he is intending to open up in the same line. Mr. McRae

suggests that firms who have been sending him catalogues and price-lists for years past should change his address on their mailing lists, so that he may continue to receive their valued trade literature.

From a British Correspondent.

Agency—A Warning.

I WOULD like to warn American manufacturers who are seeking to do business in Great Britain against relying too much on general agents. I have just had a gentleman in to see me who has been doing a manufacturers' agent's business. I remarked to him that perhaps he would like American manufacturers to know that he was ready to sell their goods. His answer was an emphatic negative.

"No," said he, "I have tried that game, and the result is failure. In my innocence, I thought the way to do a big trade was to accept as many agencies as possible, arguing that if I could not sell one line I could sell another. I have failed on that tack entirely. Last week I had a call from the president of one of the largest Hardware concerns in the States, and for the future I am going to play up to him and nobody else. We have come to an understanding which will, I think, be mutually advantageous, and if they cannot supply me with the goods I want, then I am prepared to deal with some other big manufacturing house. But I will not for the future tie myself up with a dozen different houses. The net result of that sort of thing is that I do a flimsy trade with all of them, and nothing substantial with any of them, and I do not get favorable terms. There is any amount of business to be done here in American goods, but you must fix your energies upon a few leading lines and push them for all you are worth."

My own observation indorses this gentleman's conclusion. Some time ago the representative of a large New York jobbing house came to see me. I advised him to appoint a thoroughly capable man to attend to the interests of his firm in general and not to waste his time appointing agents here, there and everywhere. He chose to take another course, and it was only the other day I saw one of his principals, who told me that his journey throughout Great Britain had barely paid his way. There are many reasons for this, one being the faculty that the average Englishman possesses of being a good servant but a bad master. Enterprising commission agents over here are few and far between. It is only recently, in discussing the matter with a prominent Hardware editor in London, we came to the conclusion that the number of really capable Hardware factors in the city of London could be counted on the fingers of one hand.

How to Do It.—The plan to do is pay your man a small salary and attractive commission and make a businesslike arrangement in the way of expenses. Nearly a year ago I wrote a long account of an interview I had with an American manufacturer who determined not to work by agency at all, but to build up a business for himself in this country. He started his own warehouse, imported his goods, got his prices and maintained them, with the result that his London business is now a little gold mine. There are not, however, many American manufacturers who would care to exercise all the patience requisite for this, and it is just possible the nature of their goods would hardly justify such a large experiment. A really responsible representative fixed up on good business lines can undoubtedly do a good trade in Great Britain.

Trade Currents.

Birmingham, Wolverhampton, Sheffield and London are full of small jobbers who are always keen on novelties, and they will repay systematic canvassing. But in addition to the jobbers in these towns there are large ironmongery establishments up and down the country who are quite capable of buying in good quantities. This class of buyer seldom looks at the general commission agent, who trades generally with the smaller fry. But they are always ready to discuss terms with a direct representative who is able to treat on behalf of his firm.

There is another branch of American trade over here which is too much neglected, and that is the shipper. The British shipping trade is not yet played out. Indeed, if anything it is the reverse, for the shippers are more and more given a free hand by foreign and colonial buyers in the filling of indents. Formerly the colonial buyer specified nearly everything he required; now he relies very largely upon the discretion of his shipper. A London shipper is as cosmopolitan as they make them. He is perfectly indifferent whether he buys in Germany or America. The Germans are canvassing him pertinaciously, but I have no manner of doubt that New York, Boston and Philadelphia can hold their own with Hamburg, Solingen and Berlin.

Trade Organization.

Is there a man on your side the water who takes a lively interest in matters affecting trade association? If so, send him across and he will make money. Let him get hold of two or three valuable commissions, and by the exercise of a little diplomacy coupled with some slight gift of public speaking he will go far. For this reason: The association movement is just taking root in England, and there is a good deal of curiosity how they do things in America. Let an American come over and tell us how it is done, and he will make friends with every ironmonger in every town of England where an association exists. Let him ask permission to attend one of the usual local association meetings and he will be cordially welcomed. When he rises to speak, let him say something like this:

Gentlemen, for some years past I have been interested in the growth of Hardware associations in my own country. I believe in them, and I should like to tell you how things are done. Not in any spirit of vain-glory or superiority. Circumstances have precipitated the movement in America, and, as we were first in the field, I think it possible that our experience may prove of service to you. Any information that I possess about them is entirely at your disposal, and if you care to ask me questions now I shall be delighted to answer them to the best of my ability.

He will be asked questions about co-operative buying, railway freights, direct trading (that is to say, trading between manufacturers or jobbers and the consumer), and I have no doubt he would be able to give the British ironmonger a good many valuable hints. He will find the ironmonger very slow to assimilate new ideas, but whether he is successful in that or not he at least makes friends with the local Hardwaremen and for purposes of trade that is more than half the battle. The local associations are affiliated to what is called the "Ironmongers' Federated Associations," who engage a paid secretary and a Central Board composed entirely of prominent Hardwaremen from every part of the kingdom. A chat with the chairman or the secretary and an expression of sympathy will probably produce letters of introduction which may prove valuable. In addition to the retail associations there is a National Hardware Association composed of jobbers and retailers. It is principally a London organization, but there are good men in it and they are worth cultivating. Then the jobbers in this country are fast realizing that they, too, must associate for trade purposes, and the voluntary ambassador, I suggest, should be able to give them hints as well. The jobbers of Birmingham, Wolverhampton, without making any conscious specific association, have recently been meeting together to discuss trade policy and prices. This movement must crystallize, and the American traveler who can help them will not suffer in pushing his own wares.

Hardware Prices.

Mention of prices reminds me that there is a general feeling over here that before long prices of raw material must come down. But the jobbers, as long as they can, will maintain their price to get back some of their profits, lost by not raising their prices soon enough when they were squeezed by the sudden advance of the price of raw material two years ago. It is generally felt

that in this instance much depends upon American competition. Already the Glasgow market is being affected by large sales of American Iron and Steel. At the moment, it is largely a question for the manufacturer and not for the jobber or the retailer. But if any American manufacturers or jobbers can get in first with low prices they have a splendid chance over here. There are several English jobbers who have determined to maintain prices as long as they possibly can. Indeed, they must do so or suffer severely in pocket. The trade boom, resulting in alleged wonderful prosperity, which has characterized English industry during the last few years has benefited the manufacturer of raw material, such as Pig Iron and Bar Iron, while the makers of metal goods and the jobbers have not had by any means an easy time of it. The sudden advance in prices has automatically increased their capital expenditure to an enormous extent, while the bankers have not been particularly obliging. The more direct methods of the American jobber should now tell their story. I know of several American jobbing houses who are at the present moment doing well for this reason alone and apart from the intrinsic value of their goods.

Canada Freights.

James W. Boyle, the United States Consul at Liverpool, has been drawing attention to the increased trade between Canada and Great Britain in consequence of the Canadian preferential tariff. His report deals mainly with agricultural produce, such as wheat, cattle, cheese and butter, but it is necessary to remember that a reciprocal trade is induced, and that English Hardware exporters have taken advantage of cheaper freights to regain some of their Canadian trade. From remarks which I have recently heard from English shippers, I would strongly recommend New York and Boston factors to watch the port of Montreal. Unless I am greatly mistaken they will find some uncommonly cheap freight rates which are worth utilizing.

American Competition in Hardware.

Mention of American competition reminds me that the *Times* has recently been discussing the competition of American Hardware and Tools in this country. The general argument of the writer is that until quite recently the Americans were successful beyond all expectation in such goods as American Stoves, American Locks, Builders' Ironmongery, Tools and Machinery and the innumerable small articles covered by these headings. But now the British manufacturer has roused himself, and by the exercise of unexpected nimbleness is making automatic machinery better and cheaper than the American.

STOVES AND BUILDERS' HARDWARE.—He says that American Stoves are now made in England, and that that business is practically lost to America. American Locks he considers to be too frail for English use, with the result (as he says) that American Locks are now seldom kept in stock, but are ordered by the agents if asked for. The general use of Cast Iron by American makers of Hardware before Cold Rolled Steel came into use resulted in rust, and enabled the competing manufacturer to consult home tastes and demands by the use of Wrought Iron in hand made goods. Finally, another element which has enabled the English maker of Builders' Hardware to regain his trade is that all building is done under the direction of architects, who stipulate that the fittings must be of certain brands with which they are familiar. In Builders' Ironmongery over-ornamentation and lack of strength have acted adversely upon the American trade, while in cases where the article is suited to the English market prompt imitation by English makers has regained the trade. I think there is a good deal of truth in the comments thus made, and American makers would do well to ponder them.

ON THE OTHER HAND, one cannot fail to be struck with the great increase in American goods observable in the catalogues of English factors. The American is

gaining, day by day, in the sale of Edged Tools, and American Saws have now so completely captured the market that it is doubtful if any English maker will ever regain it.

ARCHITECTS' INFLUENCE.—It is more than a year ago that I drew the attention of American makers to the influence which architects in this country wield. They are far more powerful and less original than their American colleagues. A friend of mine, who represents an English manufacturing firm of sanitary apparatus manufacturers, spends all his time calling upon architects. He never asks for an order, but simply keeps in touch with them, with the result that his goods are specified to quite a remarkable extent.

If you have something really striking in Builders' Ironmongery, such as Letter Plates and Door Knockers, Door Plates and Fittings of Bronze, Door Handles and Latches in Cast Iron or Cast Brass, Sliding and Hanging Door Sheaves, American Pulleys and Sash Fasteners, Transom Lifts and Catches, Chain Door Fasteners or Drawer Pulls, let the architects know about it first and foremost. For it is the architects who, to a very large extent, decide what are to be the fashions in the average English house. But I will turn to this subject again.

Trade in Hawaii.

AT a meeting of the wholesale merchants, dealers and importers of the Hawaiian Islands, held on the 25th ult., the following resolutions were adopted by the houses named:

Whereas, The Hawaiian Islands have a very limited area, and a total population of 130,000, of whom only 15,000 are of the white races, thus limiting the consuming classes and the amount of possible trade;

Whereas, There are practically no cities and towns other than Honolulu and Hilo; all other settlements being mere adjuncts to some individual plantation or landing, scarcely ever reaching the importance of a small village;

Whereas, The great distance from the main or other land, limits the area in which we may dispose of merchandise, and renders overstocking quite possible, which possibility is now increased;

Whereas, We are obliged to carry heavy lines of goods, both in quantity and variety;

Whereas, Certain manufacturing, wholesale and jobbing houses located in the States, who are constantly soliciting and receiving in a greater or less degree our patronage, have chosen in some instances to establish in the Hawaiian Islands local representatives, and others send traveling men to every hamlet and country store soliciting trade, and at the same time ask our favors and patronage;

Whereas, These representatives assume none of the responsibilities of citizens;

Whereas, These same parties, instead of adjusting themselves to the trade conditions of the islands, are pursuing a policy that can do them little ultimate good, but are producing only demoralization;

Whereas, Certain of these parties are, in their ignorance, sending their lowest quotations broadcast to the most trifling dealers, to such an extent that is not only injurious but ridiculous;

Whereas, We believe there are certain well defined and recognized principles of business that are being violated in a manner by the parties referred to, destructive to all business welfare, and which they themselves would not submit to in their own territory;

Therefore, We, the undersigned wholesale merchants, dealers and importers of the Hawaiian Islands, in convention assembled this the 25th day of September, A. D. 1900, have and hereby do

Resolve and Agree, That we are unanimously opposed to the course above referred to, pursued by certain wholesale merchants and manufacturers and others on the Pacific Coast and abroad, in sending and maintaining local agents and representatives to the Hawaiian Islands for the purpose of competition with the local wholesale and jobbing trade, by quoting and selling to the retail trade and consumers.

We, therefore, hereby pledge ourselves to refuse to accept quotations or to receive and examine samples from any commercial travelers or representatives, and to discourage houses abroad from such action by every means in our power; to the extent, wherever practicable, of withdrawing our patronage from any house in the event of their persistence, after due notification.

The foregoing is not intended to apply to representatives of houses having sole agencies with established local business houses in the islands, calling on and transacting business with such house or firm acting as their local agents, provided their business is entirely confined to such representative firm or firms. Nor shall it apply to the representatives of contractors for large plants of machinery, &c.

H. HACKFIELD & CO., LIMITED, HOFFSCHLAGER COMPANY, LIMITED, PACIFIC HARDWARE COMPANY, LIMITED, CAL. FEED COMPANY, LIMITED, E. O. HALL & SON, LIMITED, M. PHILLIPS & CO., LEWIS & CO., M. S. GRINBAUM & CO., LIMITED, W. C. PEACOCK & CO., LIMITED, THEO. H. DAVIES & CO., LIMITED, LOVEJOY & CO., LIMITED, WASH. MERCANTILE COMPANY, LIMITED, M. W. MCCLESNEY & SONS, HENRY MAY & CO., LIMITED, MACFARLANE & CO., LIMITED, HENRY WATERHOUSE & CO., UNION FEED COMPANY, LIMITED.

Business Men's Sound Money Parade.

THE Hardware and metal trades will furnish a division in the Business Men's Sound Money Parade, Saturday, November 3, under the marshalship of Alfred D. Clinch. An executive committee, of which George H. Sargent of Sargent & Co. is chairman; consists of leading members of a number of the important houses in the trade, Wm. H. Cole of Tower & Lyon being secretary, and Wm. H. Donaldson of Russell & Erwin Mfg. Company treasurer. A circular making the announcement has been issued, requesting notification to the secretary of how many persons in each house will turn out, together with some reference to the necessary expense for the proper equipment of the division.

Landers, Frary & Clark.

AT a regular meeting of the Board of Directors of Landers, Frary & Clark, New Britain, Conn., on the 15th inst. to fill the positions left vacant by the death of Charles S. Landers, Charles F. Smith was elected president and George M. Landers treasurer, the other offices being unchanged, Francis B. Cooley continuing as vice-president and George M. Landers as secretary. Henry C. Judd of Hartford was elected a director of the company.

The Deming Company's Catalogue.

THE DEMING COMPANY, Salem, Ohio, have issued their No. 20 catalogue of Hand and Power Pumps for all purposes, including Cistern, Well and Wind Mill Pumps, Iron and Brass Cylinders, Well Supplies, Hydraulic Rams, Spray Pumps and Nozzles, Triplex Power Pumps for various duties, Artesian Well Pumping Engines, &c. It is a well printed book of 270 pages, fully illustrated. Among the features of the catalogue are a convenient telegraph cipher code, general classification, alphabetical and figure indexes and many rules and tables for the information of Pump dealers and engineers. Special attention is called to the new styles of Pumps for cisterns and wells, both for house use and for farm use with wind mill; also to the many new Power Pumps for irrigating, boiler feeding, mine pumping, water works, &c.

THE trade will observe among the Special Notices one signed "Scythes," in which the advertiser announces his desire to negotiate with manufacturers who are ready to consider the making of Scythes either as a separate line or in connection with other goods. He states that his connection with the trade is such as to enable him to control a good volume of business. In view of the high prices ruling for Scythes it is possible that this opportunity may deserve the attention of manufacturers who are in a position to consider the matter.

On the recommendation of the Committee of the Franklin Institute the Goodell Company, Antrim, N. H., have received the highest award, a silver medal and diploma, from the National Export Exposition, recently held at Philadelphia, on their paring machines and Ca-hoon seed sower.

Anderson Hardware Company, Atlanta, Ga., jobbers of Shelf Hardware and Sporting Goods, have increased their capital stock and moved into the large four-story building formerly occupied by the Clarke Hardware Company, a Hardware stand for nearly 50 years.

Price-Lists, Circulars, &c.

WIRE GOODS COMPANY, Worcester, Mass.: Supplement to catalogue of January, 1899. It relates to Coat and Hat Hooks, Hotel and School Hooks, Ceiling Hooks, Harness Hooks, Gymnasium Hooks, Hitching Rings, Electric Lamp Guards, Box Thumb Screws, Trousers and Garment Hangers, Broilers and Toasters, Dish Drainers, Door Holders, &c.

THE C. S. BELL COMPANY, Hillsboro, Ohio: A very attractively printed catalogue devoted to their Steel Alloy Bells, which are fully described. It is embellished with a large number of illustrations of famous bells and churches.

LALANCE & GROSJEAN MFG. COMPANY, 19 Cliff street, New York: Second edition of a 12-page booklet, illustrating and describing their Agate Nickel-Steel Ware Cooking Utensils. Especial attention is called to the fact that no arsenic, lead, antimony or other deleterious ingredients are used in the manufacture of the enamel.

BEST STREET LIGHT COMPANY, Canton, Ohio: Circular describing the Best Incandescent Vapor Gas Lamps.

C. SIDNEY SHEPARD & Co., Chicago: Fall catalogue of Stove Pipe, Stove Boards, Stove Pipe Elbows, Coal Hods, Shovels, Roasters, Hollow Ware, Lanterns and other seasonable goods, and Metals. The catalogue comprises 40 pages, and illustrates a large and attractive variety of goods. The firm have branches in St. Louis and Kansas City, Mo.; Denver, Col., and Seattle, Wash.

F. H. PERRY & Co., Chester, Conn.: Catalogue and price-list of German Pattern Bits, Double Cut Bits, Screw Driver Bits, Electricians' Bits and Gimlets, Nail Sets, Countersinks, Reamers, Gimlets, Ice Picks, &c. To avoid confusion the manufacturers specially request that previous editions be destroyed, owing to the great number of changes made in the listing of the goods.

Trade Items.

WOLFF-AMERICAN BICYCLES will hereafter be manufactured by the Bretz Cycle Mfg. Company, Syracuse, N. Y., the entire plant of R. H. Wolff & Co., New York, being devoted to the Steel and Wire interests of that concern. The new Wolff-American plant at Syracuse will be a most complete one, capable of turning out a large quantity of wheels of first quality. Work on the new models is progressing rapidly, and an announcement will be made covering 1901 goods and policy in the near future.

E. C. ATKINS & Co., Indianapolis, Ind., have established an agency and warehouse at St. Louis, at 807 North Fourth street. The Western trade will be looked after by G. W. Gladding, for many years identified with the Memphis branch, and the city trade will be looked after by Richard D'Oench, well known to the Hardware trade. A full and well assorted stock of Hand and Cross Cut Saws, and other specialties of their manufacture, will be carried at the St. Louis agency and shipments of ordinary lots will be made directly from this point, insuring a prompt filling of orders. The territory covered by this agency comprises the States of Missouri, Kansas, Colorado, Western Illinois, and Oklahoma and Indian Territories.

GEO. F. RIEMANN, JR., 545 Broadway, New York, is the sole selling agent for Jones & Bixler Mfg. Company, Freemansburg, Pa., manufacturers of a large line of Malleable Iron Toys, such as Fire Toys, including Hook and Ladder, Trains, Locomotive, Passenger and Freight Cars, Drays, Coal, Ice, Furniture and Butcher Carts, Wagons, Phaetons, Surreys, &c. He also handles complete lines of other kinds of Toys, representing a dozen different manufactures.

THE BROOKLYN BRASS & MFG. COMPANY, 46 West Broadway and Martinsburg, W. Va., are manufacturers of a large line of fine Onyx Tables, Cabinets, Ornamental Bronzes and Clock Ornaments for home decoration. They also make lines of Gas Portables, Candelabras, Mirrors and Sconces and Photograph Frames. The company also do much special brass work and casting to specification. They have recently added a new line of goods to their product in the way of Brass Bedsteads, a permanent display of which is made at the Furniture Exchange, Grand Central Palace, Forty-third street and Lexington avenue, New York.

EMIL FORQUIGNON MFG. COMPANY, 835 Broadway, New York, are making a general line of Steel Nail Files, Manicure Instruments, Manicure Sets and Manicure Supplies. They also do mounting for the trade and make Leather Specialties for cutlery dealers, such as Razor and File Cases and Manicure Boxes, together with Razor Cases for barbers with longitudinal compartments, capable of holding 15 razors.

Hardware Merchants and Manufacturers' Association.

THE Hardware Merchants and Manufacturers' Association of Philadelphia held their annual monthly meeting at their rooms in the Bourse Building on Tuesday evening, October 16. After the routine business was disposed of an adjournment was made to the restaurant on the eighth floor, and a very fine collation was served to the members and guests, numbering in all from 75 to 80 persons.

Previous to the commencement of the social features of the evening the president, Hugh McCaffrey, called upon Charles Biddle to make some remarks in regard to two prominent members of the National Hardware Association, recently deceased—viz.: Chas. Landers of Landers, Frary & Clark, and F. H. Stanley of the Stanley Rule & Level Company. W. W. Supplee and Samuel Disston also spoke in terms eulogistic and reminiscent of these gentlemen, after which it was moved and seconded that the following should be placed upon the records of the association:

Resolved, That the Hardware Merchants and Manufacturers' Association of Philadelphia have heard with deep regret of the death of our fellow member, Charles S. Landers, with whom we have been intimately acquainted for many years, and whose genial manners have greatly endeared him to the trade. In losing him we feel we have lost a personal friend, and we desire to put on record this expression of our loss and sorrow.

Resolved, That the Hardware Merchants and Manufacturers' Association of Philadelphia have heard with much regret of the loss sustained by our fellow members, the Stanley Rule & Level Company, in the sudden death of their president, F. H. Stanley, and now desire to place on record this expression of sympathy and regard.

Upon the motion of Mr. McCaffrey, Mr. Peters of Jas. M. Vance & Co. then took the chair and the social features of the evening were entered upon. These consisted of speeches by members of the association, which were both interesting and witty, the one on "Transcendentalism," by A. C. Rex in his usual philosophic and humorous vein, being especially good. Judge Swain of Florida also made an excellent speech and was warmly applauded. Frank Conlon and an associate (professional entertainers) gave great pleasure in their songs, character sketches, &c. The evening's entertainment was one of the pleasantest and best that the association have ever enjoyed.

Miscellaneous Notes.

Tool Chests.

The American Tool Chest Company, 200 West Houston street, New York, have just put on the market for fall and holiday trade two new complete lines of boys' tool chests, which supersede others of like character long manufactured by them. This assortment is offered as in a general way superior to those made in the past. One line is known as the Standard, and is made in 17 sizes of chest, the material being chestnut wood with stained moldings. The number of tools in the various boxes has been enlarged, and a better class of goods furnished. This line can be supplied at from \$8 a gross to \$40 a dozen boxes. The other line is known as the Liberty, made in the same styles and sizes, being similar in arrangement but containing tools of better quality. This concern also manufacture tool chests, both empty and complete, with tools for gentlemen, amateurs or professional mechanics costing as high as \$200 each.

Springs.

The American Steel & Wire Company are very large manufacturers of springs at their Worcester and Waukegan Works. The product of these factories covers the entire range of extension, compression, torsion and flat springs. They have just issued a catalogue of 60 pages, which is devoted exclusively to springs. The products of the company, as shown by this catalogue, cover practically every conceivable variety from watch springs up to car truck springs. A great deal of useful information in connection with springs is also conveyed in this publication. The company state that few springs are susceptible of being carried in stock, but they must be made in accordance with the requirements of each purchaser. The company, being specialists in steel, as well as in spring manufacture, are in a position to obtain the best results.

Bathroom Fixtures and Chafing Dishes.

Manning, Bowman & Co., 25 West Broadway, New York, and Meriden, Conn., have added several new

copper. One end can be used as a putty knife, and the other end as a glass trimmer. The main characteristic of this article is the special care used in making the cutter wheels, which are formed from Damascus coal grain



Fig. 1.—Waldorf-Astoria One-Piece Can Opener.

complete lines to their already large assortment of bathroom fixtures in nicked brass. Among them are new

carbon steel. A large number of round wires are condensed into a steel bar and from that material is forged



Fig. 2.—Red Devil Glass Cutter.

combinations of tumbler and tooth brush holder and triple combinations of tumbler, tooth brush and soap holders. The feature of each is the ornamental open work designs instead of plain work as heretofore. There are also a number of bracket soap dishes in round, plain, beaded and Rococo finishes. Another novelty is a toilet holder for roll paper. They also have a new combination for bathtub, sponge and soap. Other novelties in this line are brush and comb trays and towel bars. These goods are furnished in both nicked and silver plated finishes. In chafing dishes they manufacture 40 styles, both nicked and silver plated, seven of which are entirely new for this season's trade. The lists range from \$5 to \$25 each for the nickel plated, and \$10 to \$35 each for the silver plated. A distinguishing characteristic of these chafing dishes is that the Perfection lamp and finely enameled food pan are furnished with them. The Perfection lamp is so made that by moving the handle laterally the flame can be regulated or entirely extinguished instantly, the handle opening or closing two thin plates above the flame, which control or extinguish it entirely. Another betterment in connection with the new chafing dish is the solid base, which strengthens the frame and enhances the appearance of the article.

Steel Curry Combs.

The Parish & Bingham Company, Cleveland, Ohio, heretofore manufacturers of sheet metal bicycle material, are preparing to announce a line of stamped cold rolled steel curry combs. A 32-page catalogue illustrates a larger number of patterns of solid and open back curry combs, with and without mane combs.

Can Opener and Glass Cutter.

Smith & Hemenway Company, 296 Broadway, New York, are manufacturing a line of sheet metal hardware novelties, two of which are here shown in the accompanying illustrations. Fig. 1 illustrates the Waldorf-Astoria can opener, the peculiarity of which is that it is formed entirely of one piece of sheet steel with a cen-

the cutter wheel. These goods are also mounted, one dozen on an easel back display card.

The Brauer Ankle Supporter.

Brauer Bros., 2004 Locust street, St. Louis, Mo., are putting on the market their patented ankle supporter, shown herewith. It is made of russet oak tan leather, so designed with openings for the ankle bones as to allow the movement of the foot when skating to be quite free,



The Brauer Ankle Supporter.

and at the same time to support the ankle effectively. The supporter is made in sizes for men, women and children.

New Pattern Knife and Flat Ware.

The International Silver Company are offering new patterns of knife and flat ware, shown herewith. The knife is of solid steel, silver plated, and has a round

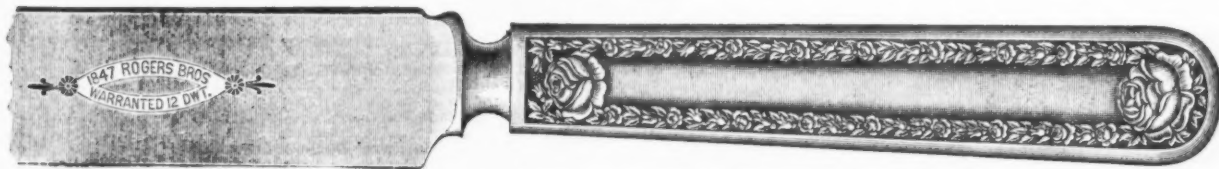


Fig. 1 — Rose Pattern Knife.

ter cut, and a guide so constructed as to keep the opener close to the edge of the can. The blades are tempered and sharpened, the entire tool being nickel plated on copper, and burnished. They are mounted one dozen on

bolster, doing away, it is explained, with the sharp corners on the part having the hardest wear. The spoon illustrated in Fig. 2 represents a line of flat ware of this pattern, including table, dessert and soup spoons, forks,



Fig. 2.—Nassau Pattern Spoon.

an easel back display card. Fig. 2 represents the Red Devil glass cutter, which is also made of one piece of sheet metal as will be seen in cut, and is nicked on

sugar shell, berry spoon, cold meat fork, &c. The flat ware is in the Holmes and Edwards brand, while the knife is in the 1847 Rogers Brothers brand.

Acme Ball Bearing Casters.

The Acme Ball Bearing Caster Company, 463 Greenwich street, New York, have recently put on the market another form of their Acme ball bearing caster, which is here illustrated in the plate and stem styles. Fig. 1 illustrates the general appearance of the caster, Fig. 2 being a sectional view to show the system of ball bearings. Fig. 3 embodies the same principles, but is made with stem and socket instead of plate. This caster



Fig. 1.—Acme Ball Bearing Plate Caster.



Fig. 2.—Sectional View of Plate Caster.

is made in one piece from sheet steel, the company calling special attention to the fact that the weight imposed upon it falls directly over the center of gravity. As shown by the engravings the coppered steel surface ball revolves upon a number of high grade steel balls, which are automatically interchangeable upon a steel disk and move in any direction with slight pressure. This caster is made in 1, 1½ and 1¾ inch diameter of ball and the shells are nickel plated. The one piece shell of the plate caster, illustrated in Figs. 1 and 2, is identical

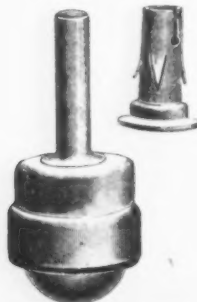
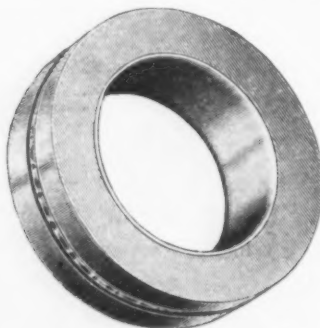


Fig. 3.—Ball Bearing Stem and Socket Caster.

in construction with the stem caster more clearly shown in Fig. 3, except that a steel plate to carry the screws is forced over the upper part of the shell and rests against an offset which extends about ¼ inch laterally. These casters are suitable for all kinds of furniture, brass and iron bedsteads, sliding doors and other articles of kindred character that are designed to be moved on rollers.

The Allen & Winn Equalizer.

The device illustrated herewith has been designed for the purpose of equalizing the strain on both a vise and its operator. It is manufactured by the Allen & Winn Mfg. Company, 85 Fifth avenue, Chicago. It consists



The Allen & Winn Equalizer.

of an annular steel box, with movable ends capable of revolving on ball bearings. The device is applied by moving the screw rod of the vise, on which it is slipped, thus taking the place of the face washer. A vise thus equipped requires the least amount of power in gripping its work for the greatest results. No matter how great the tension required to hold the work may be, it is stated, the tendency to bind on releasing the vise is completely overcome by the action of this equalizer. It is essentially an anti-friction device, reducing the friction to a

minimum. By equalizing the strain, increasing the leverage and distributing the pressure, it prevents sudden strains from breaking the vise, while the slightest pressure on the lever will release the vise. We are advised that thorough tests have shown that the greatest jar on the work will not affect the appliance, and it is claimed not only to lengthen the life of a vise, but to increase its capacity. The standard sizes carried in stock are ¾, 1 and 1 3-16 inches in inside diameter. Other sizes can be made if ordered.

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Economy Stocks and Dies.

The accompanying cuts represent a stock and die for pipe threading, offered by F. E. Wells & Son, Greenfield, Mass. The dies shown in Fig. 1 are made with

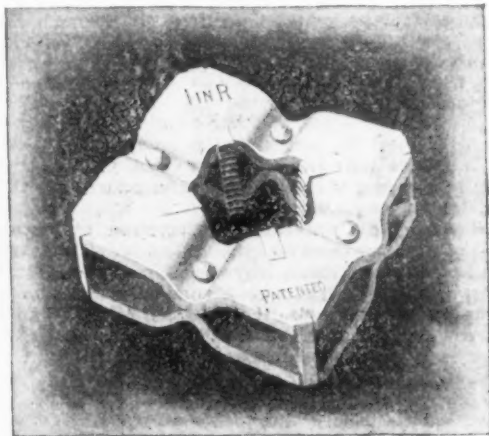


Fig. 1.—Economy Die

four cutters of the best steel, it is remarked, interlocked with two homogeneous steel plates. When the parts are assembled they are pressed together and riveted, under

to put oil where it will do the most good, that they are true to size, as, being made partly of non-hardening steel, they do not change when hardened; that they cost no more than solid dies, that they are light and are fully guaranteed.

The stocks shown in Fig. 2 are referred to as being made for strength, the center piece being malleable iron and the handles of steel pipe, screwed into the stock to a taper fit. The knurled handles are designed to prevent the hands slipping. The center part of the stock is black, the handles are polished and the ends are closed.

Carborundum Knife Sharpener.

The accompanying cut is of a carborundum knife sharpener offered by the Carborundum Company, Niagara Falls, N. Y. The sharpener has a steel rod through the center to make it practically indestructible, a plated guard and polished cherry handle. It is designed for general use in sharpening all knives, from kitchen to carving. It is stated that the sharpener will make an edge that is superior to that produced by a grindstone and in one-tenth of the time. The sharpeners are packed in boxes, each containing a dozen, so made that they will stand upright on a counter or showcase to make a display.

Nicholson File Company, Providence, R. I., are distributing among their customers an attractive enameled sign. It is a steel plaque, finished in a deep blue enamel on one side and a brilliant scarlet on the reverse. Cuts

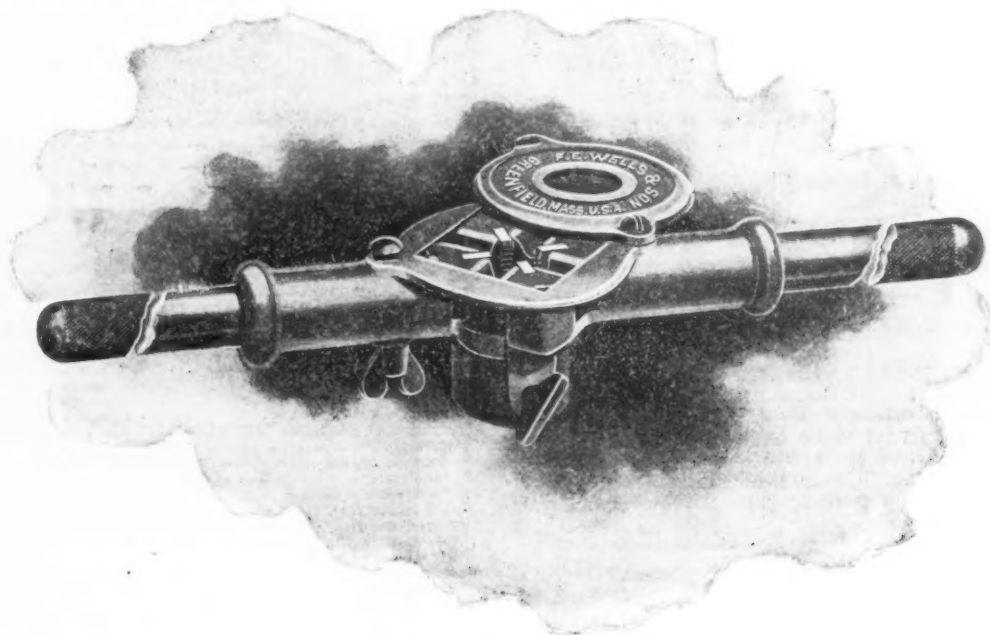
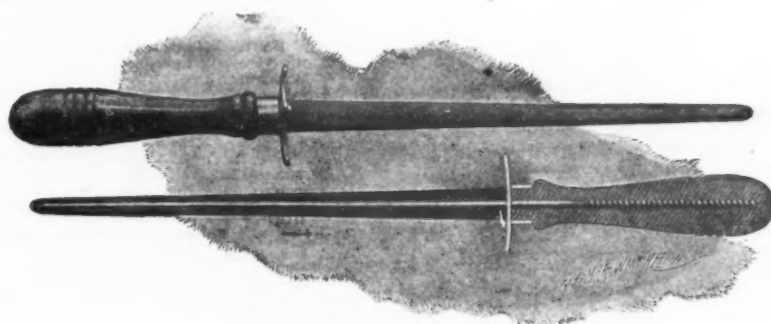


Fig. 2.—Economy Stock

heavy pressure, to make them perfectly rigid. They are tempered by a special process of the manufacturers which, it is stated, insures great wearing qualities. The manufacturers explain that the dies have all the

of file and rasp are shown in the exact shade of color of the steel, while the lettering is in silver and white. The plaque is designed to be hung up, and makes a fine showing on the counter or walls of the hardware store.



Carborundum Knife Sharpener.

advantages of the ordinary solid pipe dies, that they can be used with any make of stock, that they wear longer because the best steel is used, that they cut easier because there is clearance for chips and a place

The company will be pleased to furnish all wholesale and retail dealers who handle their files and rasps, as well as all machine and other shops where their files are used, with the above sign upon receipt of a request.

Kern Burner.

The Kern Incandescent Gas Light Company, 10 Murray street, New York, are the manufacturers of the Kern burner, a few examples of which are here illustrated. It consists primarily in the Bunsen tube, which by a new form of construction, it is said, becomes a self mix-



Fig. 1.—Kern Standard Single Burner.

ing burner, requiring no adjustment of air by movable shutters. This burner has been brought out to overcome difficulties which have been encountered in the past in incandescent burners of this character, it having been found that gases and air have not always mixed homo-

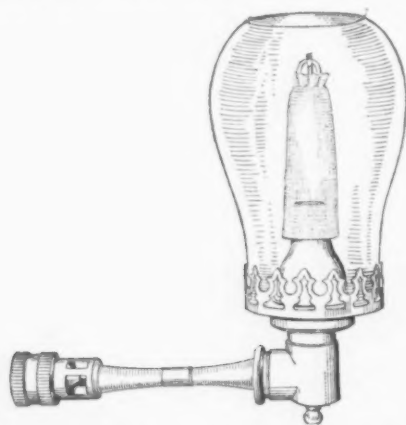


Fig. 2.—Kern L or Bracket Burner Complete.

geneously in the ordinary Bunsen tube and therefore were not perfectly consumed. The flame given out in the ordinary burner is blue, the flame produced having a green cone. The product of the Kern Bunsen is a flame having a purple color, tipped with white.



Fig. 3.—Kern Stalactite Burner.

This flame, hanging close to the Bunsen, it is claimed, creates in an incandescent mantle what is called hyper-incandescence. In addition, it is pointed out that the gas obtains a greater speed or pressure at the exit than at the initial point, thus enabling the hyper-incandescence

to be conveyed to the extreme top of the mantle. Some of the advantages claimed by the manufacturers are a luminosity two to three times greater than in previously discovered burners; no chimney being required (as the burner creates its own pressure), there is great economy in maintenance by avoiding the breakage of glass; gases are perfectly consumed and the mantles do not blacken, therefore it is said they are not so easily broken; as the lighting efficiency per cubic foot is great, small quantities of gas are used, therefore throwing out less heat. The burners are made to consume from 8-10 cubic foot of gas per hour upward, so that the light can thus be subdivided and used economically. Small globes (about the size of the 16-candle electric bulb) are made in all colors, sizes and shapes, and can be grouped to suit by the company's ball bearing fitting. A catalogue of 24 pages illustrates and describes a number of varieties and styles. For decorative purposes the Kern burner can be put into many shapes, styles, groups, stalactites (or downward globes), ceiling cluster lights with or without reflectors, and in almost any form or style of small or large light. For large spaces they have groups giving 1200 candles, which effectively take the place of the arc light.

The Windsor Gas Stove.

Herewith is shown the Windsor gas stove for natural or artificial gas, which is one of the new patterns of gas heating goods offered this season by the Reineke, Willson Company, Pittsburgh, Pa. The Windsor is a surface



The Windsor Gas Stove.

burner stove, made in an entirely new design and of improved construction. The body of the stove is of planished iron, and it has a cast iron hood and corner pieces and sheet brass fender, all finished in oxidized copper. All the other trimmings and ornaments are copper finished. An attractive dress guard is furnished on each stove, assuring safety from fire. The burner is a hollow back wall or chamber, at the bottom of which the gas and air enter and are thoroughly mixed and superheated before being consumed at the several rows of perforations in front. The flame permeates the asbestos fiber and spreads over the entire surface of the back wall, causing a quick radiation of heat, and producing a cheerful and luminous fire. The cold air enters at the base and is drawn through the stove, passing out into the room through the ornamental hood in a heated condition. It is pointed out that the products of combustion do not come in contact with the heated air at any time, but are carried off through the flues, so that no odor of burnt gas can escape into the room. The Windsor stove is 24½ inches wide, 30 inches high and 8 inches in depth, and is fitted for a 4-inch flue connection.

Fox & Mills, Lampasas, Texas, have moved their Hardware, Stove, Farm Implement and Sporting Goods business into larger and more commodious quarters.

Current Hardware Prices.

REVISED OCTOBER 16, 1900.

General Goods.—In the following quotations General Goods—that is, those which are made by more than one manufacturer, are printed in *Italics*, and the prices named represent those current in the market as obtainable by the fair retail Hardware trade, whether from manufacturers or jobbers. They apply to such quantities of goods as are usually purchased by retail merchants. Very small orders and broken packages often command higher prices, while lower prices are frequently given to larger buyers.

Special Goods.—Quotations printed in the ordinary type (Roman) relate to goods of particular manufacturers, who are responsible for their correctness. They usually represent the prices to the small trade, lower prices being obtainable by the fair retail trade, from manufacturers or jobbers.

Adjusters Blind—

Domestic, $\frac{1}{2}$ doz. \$3.00...33 $\frac{1}{2}$ @33 $\frac{1}{2}$ @10 $\frac{1}{2}$
North's...10 $\frac{1}{2}$
Zimmerman's—See Fasteners. Blind.

Window Stop—

Ives' Patent...25 $\frac{1}{2}$ @5 $\frac{1}{2}$
Tapias' Perfection...30 $\frac{1}{2}$

Ammunition—See Caps, Cartridges, Shells, &c.

Anvils—American—

Eagle Anvils...7 $\frac{1}{2}$ @7 $\frac{1}{2}$ @7 $\frac{1}{2}$
Hay-Hadden, Wrought...9 $\frac{1}{2}$ @9 $\frac{1}{2}$
Horseshoe brand, Wrought...9 $\frac{1}{2}$ @9 $\frac{1}{2}$
Samson...7 $\frac{1}{2}$ @7 $\frac{1}{2}$
Trenton, Wrought...8 $\frac{1}{2}$ @8 $\frac{1}{2}$
Buel Pat. Trenton Wrought...9 $\frac{1}{2}$ @9 $\frac{1}{2}$
Vulcan Wrought...8 $\frac{1}{2}$ @8 $\frac{1}{2}$

Imported—

Armitage's Mouse Hole...8 $\frac{1}{2}$ @8 $\frac{1}{2}$
Peter Wright's...9 $\frac{1}{2}$ @9 $\frac{1}{2}$

Anvil, Vise and Drill—

Millers Falls Co., \$18.00...20 $\frac{1}{2}$

Apple Parers—See Parers, Apple, &c.

Aprons, Blacksmiths'—

Hull & Hoyt Co.
Lots of 1 doz...25 $\frac{1}{2}$
Lots of 3 doz...25 $\frac{1}{2}$
Lots of 5 doz...30 $\frac{1}{2}$

Augers and Bits—

Com. Double Spur...60 $\frac{1}{2}$ @10 $\frac{1}{2}$ @70 $\frac{1}{2}$ @5 $\frac{1}{2}$
Boring Machine Augers...60 $\frac{1}{2}$ @10 $\frac{1}{2}$ @70 $\frac{1}{2}$ @5 $\frac{1}{2}$

Car Bits, 12-in. twist—

Jennings' Pattern...60 $\frac{1}{2}$ @10 $\frac{1}{2}$ @70 $\frac{1}{2}$ @5 $\frac{1}{2}$

Auger Bits—

Ford's Auger and Car Bits...10 $\frac{1}{2}$ @10 $\frac{1}{2}$ @70 $\frac{1}{2}$ @5 $\frac{1}{2}$

Forster Pat. Auger Bits—

C. E. Jennings & Co...20 $\frac{1}{2}$

No. 10 ext. lip. R. Jennings' list—

No. 30. R. Jennings' list...40 $\frac{1}{2}$

Russell Jennings—

L'Hommedieu Car Bits...10 $\frac{1}{2}$ @10 $\frac{1}{2}$ @70 $\frac{1}{2}$ @5 $\frac{1}{2}$

Pugh's Black—

Pugh's Jennings' Pattern...35 $\frac{1}{2}$

Snell's Auger Bits—

Snell's Auger Bits...60 $\frac{1}{2}$

Snell's Bell Hangers' Bits—

Snell's Car Bits, 12-in. twist...60 $\frac{1}{2}$

Wright's Jennings Bits (R. Jennings' list)—

Standard list...60 $\frac{1}{2}$ @10 $\frac{1}{2}$ @70 $\frac{1}{2}$ @5 $\frac{1}{2}$

Expansive Bits—

Clark's small, \$18; large, \$28...50 $\frac{1}{2}$ @10 $\frac{1}{2}$ @70 $\frac{1}{2}$ @5 $\frac{1}{2}$

Lavigne's Clark's Pattern, No. 1—

doz., \$28; No. 2, \$18...50 $\frac{1}{2}$ @10 $\frac{1}{2}$ @70 $\frac{1}{2}$ @5 $\frac{1}{2}$

C. E. Jennings & Co., Steer's Pat.—

Swan's...60 $\frac{1}{2}$

Gimlet Bits—

Common Double Cut, gro. \$2.00 @ 2.75

German Pattern...gro. \$3.25 @ 5.00

Double Cut, makers' lists...2 $\frac{1}{2}$ @5 $\frac{1}{2}$ @10 $\frac{1}{2}$

Hollow Augers—

Amos...25 $\frac{1}{2}$ @10 $\frac{1}{2}$

Bouney's Adjustable, $\frac{1}{2}$ doz...\$16.00

New Patent...25 $\frac{1}{2}$ @10 $\frac{1}{2}$

Universal...20 $\frac{1}{2}$

Ship Augers and Bits—

Ford's...40 $\frac{1}{2}$

S. ell's...40 $\frac{1}{2}$

C. E. Jennings & Co...15 $\frac{1}{2}$ @10 $\frac{1}{2}$

L'Hommedieu's...15 $\frac{1}{2}$ @10 $\frac{1}{2}$

Awl Hafts, See Hafts, Awl.

Awls—

Brad Awls:
Handled...gro. \$2.75 @ 3.10

Unhandl'd, Shouldered gro. \$3.00 @ 3.50

Unhandl'd, Patent...gro. 60 $\frac{1}{2}$ @70 $\frac{1}{2}$

Peg Awls:
Unhandl'd, Patent...gro. \$1 @ 1 $\frac{1}{2}$

Unhandl'd, Shouldered gro. \$1 @ 1 $\frac{1}{2}$

Scratch Awls:
Handled, Common gro. \$3.50 @ 4.00

Handled, Socket...gro. \$11.50 @ 12.00

Awl and Tool Sets—See Sets, Awl and Tool.

Axes—

First Quality, best brands...\$6.25 @ 6.50

First Quality, other brands...\$6.00 @ 6.25

Jobbers' Special Brands:
Good Quality...\$5.00 @ 5.50

Best Quality...\$6.25

Cheap, Handled Axes...\$5.50 @ 5.75

Beveled, add 25c doz.

Axle Grease—See Grease, Axle.

Axles—

Concord, Loose Collar...4 $\frac{1}{2}$ @5 $\frac{1}{2}$

Concord, Solid Collar...5 $\frac{1}{2}$ @6 $\frac{1}{2}$

No. 1 Common...3 $\frac{1}{2}$ @4 $\frac{1}{2}$

No. 1 & 2 Com. New Style...3 $\frac{1}{2}$ @4 $\frac{1}{2}$

No. 2 Solid Collar...3 $\frac{1}{2}$ @4 $\frac{1}{2}$

Nos. 7, 8, 11 to 14...75 $\frac{1}{2}$ @10 $\frac{1}{2}$

Nos. 15 to 18...60 $\frac{1}{2}$ @10 $\frac{1}{2}$

Nos. 19 to 22...75 $\frac{1}{2}$ @10 $\frac{1}{2}$

Boxes, Axle—

Common and Concord, not turned...15 $\frac{1}{2}$

Common and Concord, turned...16 $\frac{1}{2}$

Half Patent...16 $\frac{1}{2}$

Balances—

Caldwell new list...50 $\frac{1}{2}$

Fulman's...60 $\frac{1}{2}$

Spring—

Spring Balances...50 $\frac{1}{2}$ @5 $\frac{1}{2}$

Chatillon's Light Spec. Balances...40 $\frac{1}{2}$ @10 $\frac{1}{2}$

Chatillon Straight Balances...40 $\frac{1}{2}$

Chatillon Circular Balances...50 $\frac{1}{2}$

Chatillon's Large D...40 $\frac{1}{2}$

Perfection...50 $\frac{1}{2}$

Barb Wire—See Wire, Barb.

Bars—

Steel Crowbars, 10 to 14 lb. per lb...3 $\frac{1}{2}$ @4 $\frac{1}{2}$

Beams, Scale—

Scale Beams, list Jan. 12, '92...30 $\frac{1}{2}$ @30 $\frac{1}{2}$

Chatillon's No. 1...30 $\frac{1}{2}$

Chatillon's No. 2...40 $\frac{1}{2}$

Beaters—

Standard Co.:
No. 5 Steel Handle Dover...gro. \$6.50

No. 10 Cast Handle Dover...gro. \$8.00

No. 10 St. el Handle Dover...gro. \$8.00

No. 15 Extra Heavy Steel Handle...gro. \$15.00

Rival, gro. \$1.00

Taplin Mfg. Co.:
No. 50 Small Family size...\$4.50

No. 100 Regular Family size...\$8.00

No. 102 Regular Family size tinned...\$9.50

No. 150 Large Family size...\$15.00

No. 152 Large Family size, tinned...\$17.00

Lyon's, Standard sls...\$ doz. \$1.75

Wunder (S. S. & Co.)...gro. \$7.50

Bellows—

Blacksmith, Standard list 70 $\frac{1}{2}$ @75 $\frac{1}{2}$

C. E. Jennings & Co., Blacksmith...60 $\frac{1}{2}$ @10 $\frac{1}{2}$

C. E. Jennings & Co., Hand...33 $\frac{1}{2}$ @35 $\frac{1}{2}$

Blacksmiths—

Inch...30 32 34 36 38 40

Each...\$3.70 3.95 4.25 4.50 4.75 5.00 5.25 5.50 5.75 6.00 6.25

Extra Length:

Each...\$4.25 4.50 4.75 5.00 5.25 5.50 5.75 6.00 6.25 6.50 6.75

Molders—

Inch...9 10 11 12 14 16

Doz...\$6.75 7.25 7.75 8.25 8.75 9.25 9.75 10.25 10.75 11.25 11.75

Hand—

Inch...6 7 8 9 10 12

Doz...\$3.75 4.25 4.75 5.00 5.25 5.50 5.75 6.00 6.25 6.50 6.75

Bells—

Ordinary goods...75 $\frac{1}{2}$ @10 $\frac{1}{2}$

High grade...70 $\frac{1}{2}$ @70 $\frac{1}{2}$

Jersey...75 $\frac{1}{2}$ @75 $\frac{1}{2}$

Texas Star...50 $\frac{1}{2}$ @10 $\frac{1}{2}$

Door—

Abbe's Gong...45 $\frac{1}{2}$

Barton Gong...55 $\frac{1}{2}$

Gong, Yankee...50 $\frac{1}{2}$

Horn, R. & E. Mfg. Co.'s...50 $\frac{1}{2}$ @10 $\frac{1}{2}$

Lever and Pull, Hand s...20 $\frac{1}{2}$ @10 $\frac{1}{2}$

Hand Bells—

White Metal...60 $\frac{1}{2}$ @60 $\frac{1}{2}$

Nickel Plated...50 $\frac{1}{2}$ @50 $\frac{1}{2}$

Silver...50 $\frac{1}{2}$ @50 $\frac{1}{2}$

Silver Chime...38 $\frac{1}{2}$ @38 $\frac{1}{2}$

Miscellaneous—

Farm Bells...12 @ 2 $\frac{1}{2}$ @5 $\frac{1}{2}$

Steel Alloy Church and School...50 $\frac{1}{2}$ @10 $\frac{1}{2}$

Wilmet & Hobbs Mfg. Co., Gongs...70 $\frac{1}{2}$

Belting Rubber—

Common Standard...70 $\frac{1}{2}$ @10 $\frac{1}{2}$

Standard...60 $\frac{1}{2}$ @10 $\frac{1}{2}$

Extra...60 $\frac{1}{2}$ @10 $\frac{1}{2}$

High Grade...60 $\frac{1}{2}$ @10 $\frac{1}{2}$

Leather—

Extra Heavy, Short Lap...50 $\frac{1}{2}$ @10 $\frac{1}{2}$

Cut Prices.—In the present condition of the market there is a good deal of cutting of prices by the jobbing trade, whose quotations are often lower than those of the manufacturers.

Names of Manufacturers.—For the names and addresses of manufacturers see the advertising columns and also THE IRON AGE INDEX SUPPLEMENT (May 3, 1900), which gives a classified list of the products of our advertisers and thus serves as a DIRECTORY of the Iron, Hardware and Machinery trades.

Standard Lists.—A new edition of "Standard Hardware Lists" has been issued and contains the list prices of many leading goods.

Additions and Corrections.—The trade are requested to suggest any improvements with a view to rendering these quotations as correct and as useful as possible to Retail Hardware Merchants.

Regular Short Lap 60 $\frac{1}{2}$ @10 $\frac{1}{2}$ @70 $\frac{1}{2}$ @5 $\frac{1}{2}$

Standard...60 $\frac{1}{2}$ @10 $\frac{1}{2}$ @70 $\frac{1}{2}$ @5 $\frac{1}{2}$

Light Standard...70 $\frac{1}{2}$ @70 $\frac{1}{2}$

Cotton—

Rossendale-Reddaway B. & H. Co.:
Sphinx B and...60 $\frac{1}{2}$ @10 $\frac{1}{2}$

Durable Bran t...70 $\frac{1}{2}$

Bench Stops—See Stops, Bench

Benders and Upsetters,

Tire—

Green River Tire Benders and Upsetters...20 $\frac{1}{2}$

Stoddard's Lightning Tire Upsetters...40 $\frac{1}{2}$ @50 $\frac{1}{2}$

Bicycle Goods—

John S. Lang's Son's 1899 list:
Cha h...50 $\frac{1}{2}$

Part...50 $\frac{1}{2}$

Spokes...50 $\frac{1}{2}$

Tub s...60 $\frac{1}{2}$

Bits—

Auger, Gimlet, Bit Stock Drills, &c.—
See Augers and Bits.

Bit Holders—See Holders.

Blind Adjusters—See Adjusters, Blind.

Blind Fasteners—See Fasteners, Blind.

Blind Staples—See Staples, Blind.

Blocks—

Common Wooden...70 $\frac{1}{2}$ @70 $\frac{1}{2}$

Cleveland and Steel...50 $\frac{1}{2}$ @10 $\frac{1}{2}$

Eddy's steel...60 $\frac{1}{2}$ @10 $\frac{1}{2}$

Hartz Steel...50 $\frac{1}{2}$ @10 $\frac{1}{2}$

Ford's Star Brand Self Lubricating...60 $\frac{1}{2}$ @10 $\frac{1}{2}$

Hollow Steel, Ford's Pat. Star Brand...50 $\frac{1}{2}$ @10 $\frac{1}{2}$

Junior...30 $\frac{1}{2}$

Stowell's Novelty, Mal. Iron...50 $\frac{1}{2}$

See also Machines, Hoisting.

Beards, Stove—

Zinc, Crystal, &c...50 $\frac{1}{2}$ @10 $\frac{1}{2}$

Climlets—

Steel Metal, Assorted, gro. \$1.40@1.75
 Metal, Assorted, gro. \$3.00@3.50
 Wood Handled, Assorted, gro. \$1.00@1.25
 Wood Handled, Assorted, gro. \$5.00@5.25

Class, American Window

List Jan 1, 1898.
 Lots from store:
 Single, Eastern. .85¢
 Second and Third Brackets. .85¢@1.00
 Eastern, All Other Brackets. .85¢@1.00
 Double, Eastern. .85¢
 Double Bracket. .85¢
 Second, Third, Fourth and Fifth Brackets. .85¢@1.00
 Other Brackets. .85¢@1.00
 From Jobbers Factory, with Freight Allowance, except in Eastern district:

Carloads, Single Strength. .85¢@25¢
 First Bracket. .85¢@25¢
 Second and Third Brackets. .85¢
 All Above. .90¢@5¢
 Carloads, Double Strength
 First Five Brackets. .89¢
 6 inch Bracket. .90¢
 7 to 100 inch Bracket, inclusive. .90¢@10¢5¢
 All Above. .90¢@20¢

Clue—Liquid, Fish

Last A, Bottles or Cans, with Brush. .57¢@50¢

List B, Cans (½ pts., pts., qts.)53¢@18¢

List C, Cans (½ gal., gal.)25¢@15¢

Glue Pots—See Pots, Glue.**Grease, Axle—**

Common Grade.gro. \$5.00@6.00
 Dixon's Everlasting.10 m pails, ea. 55¢
 Dixon's Everlasting, in bxs.doz. 1 m \$1.20; 2 m \$2.00

Grindstone Fixtures—

See Fixtures, Grindstone.

Guards, Snow—

Cleveland Wire Soiling Co. \$2.00

Galv. Steel 1000. \$18.00

Gun Powder—See Powder.**Hack Saws—See Saws.****Hacks, Axi—**

Peg Patent, Leather Top.gro. \$4.90@5.25

Peg Patent, Plain Top. \$5.50@5.75

Sealing, Brass Ferrule. \$1.50@1.60

Saddlers', Brass Ferrule. \$1.55@1.65

Peg, Common. \$1.25@1.35

Brad, Common. \$1.50@1.75

Halters and Ties—

Covert Mfg. Co., Web. 45¢@2¢

Covert Mfg. Co., Jute Rope. 45¢@2¢

Covert Mfg. Co., Sisal Rope. 30¢@2¢

Covert's Saddlery Works, 98 list. 60¢@10¢

Covert's Saddlery Works, Leather 80¢@10¢

Covert's Saddlery Works, Jute. 60¢@5¢

Covert's Saddlery Works, Sisal. 60¢

Covert's Saddlery Works, Manila. 60¢@5¢

Covert's Saddlery Works, Cotton. 70¢

Hammers—**Handled Hammers—**

Heller's Machinists'. 60¢@50¢5¢

Heller's Farriers'. 50¢@50¢5¢

Magnetic Tack, Nos. 1, 2, 3, \$1.25, \$1.50, \$1.75.

Pack, Skow & Wilcox. 40¢@40¢5¢

Fayette R. Plumb. 40¢@40¢10¢

Plumb, A. E. Nail. 40¢@40¢10¢

Engineers' and B. S. Hand. 60¢@7¢@60¢10¢7¢4¢

Machinists' Hammers. 70¢@7¢@60¢10¢7¢4¢

Riveting and Tanners'. 30¢@50¢10¢

Sargent's C. S. New List. 45¢@10¢

Heavy Hammers and Sledges—

3 lb. and under.lb. 45¢

5 to 10 lb.lb. 30¢-80¢@50

Over 10 lb.lb. 30¢-10¢

Wilkinson's Smiths'.9¢@10¢10¢

Handcuffs and Leg Irons

See Police Goods.

Handles—**Agricultural Tool Handles—**

Hoe Rake, Fork, &c.60¢@80¢10¢

Shovel, &c., Wood D Handle.50¢@50¢5¢

Cross-Cut Saw Handles—

Atkins'.40¢@5¢

Champion.60¢@15¢10¢

Dixson.50¢

Mechanics' Tool Handles—

Auger, assorted.gro. \$2.40@2.60

Auger, large.gro. \$2.85@3.00

Brad Axl.gro. \$1.50@1.75

Chisel Handles—

Apple Tanged Firmer, gro. ass'd. \$2.25@2.55; large, \$2.50@2.80.

Hickory Tanged Firmer, gro. ass'd. \$1.75@2.25; large, \$2.35@2.50.

Apple Socket Firmer, gro. ass'd. \$1.75@2.50; large, \$2.00@2.25.

Hickory Socket Firmer, gro. ass'd. \$1.00@1.75; large, \$1.75@2.00.

Hickory Socket Framing, gro. ass'd. \$2.60@2.75; large, \$2.65@2.85.

File, assorted.gro. \$1.00@1.15

Hammer, Hatchet, Axe, &c. 50¢

Hard Saw, Varnished, doz. 75¢@80¢

Not Varnished.55¢@90¢

Plane Handles:
 Jack, doz. 25¢@35¢; Jack Bolted. 55¢@60¢
 Fore, doz. 35¢@38¢; Fore Bolted. 70¢@75¢

Hangers—

Barn Door, New Pattern, Round Groove, Regular:
 Inch.3 4 5 6 8
 Doz. \$1.10 1.45 1.80 2.10 2.75

Barn Door, New England Pattern, Check Back, Round Groove, Regular:
 Inch.3 4 5 6 8
 Doz. \$1.50 2.00 2.60 3.25

Chicago Spring Butt Co.: 25¢

Oscillating. 25¢

Big Twin. 25¢

Chisholm & Moore Mfg. Co.: 50¢

Baggage Car Door. 40¢

Elevator. 40¢

Coleman Hardware Mfg. Co.: 55¢

Czar Ball Bearing.doz. pair \$7.50

No. 10 Roller Bearing.doz. pr. 5.50

No. 20 Roller Bearing.doz. pr. 4.50

Nickel. 50¢

J. G. C. 50¢@10¢

Crunk Hanger & Co.: 60¢

Loose Axle. 60¢

Roller Bearing. 60¢@10¢

Lane Bros.: 83¢25

Parlor, Standard. \$3.75

Parlor, New Model. \$3.75

Barn Door, Standard. 40¢@10¢

Covered. 50¢@10¢10¢5¢

Special. 60¢@10¢

Lawrence Bros.: 60¢

Advance. 60¢

Cleveland. 60¢@10¢

Crown. 60¢

New York. 60¢

Peerless. 60¢@10¢

Sterling. 60¢

McKinney Mfg. Co.: 60¢@10¢

No. 2, Standard. \$1.80

No. 3, Standard. \$1.80

Stowell Mfg. and Foundry Co.: 60¢@10¢

Badger. 60¢

Baggage Car Door. 33¢45

Climax Anti-Friction. 50¢

Elevator. 50¢

Interstate. 50¢@10¢

Magie. 50¢

Matchless. 50¢@10¢

Nansen. 50¢@10¢

Parlor Door. 50¢

Railroad. 50¢@10¢

Street Car Door. 50¢@10¢

Steel, Nos. 300, 400, 500. 40¢@15¢

Wild West. 50¢@5¢

Zenith for Wood Track. 50¢@10¢

Taylor & Boggs Foundry Co.: 50¢@50¢10¢

Kidder's. 50¢@50¢10¢

Van Wagoner & Williams Hdw. Co.: 50¢@50¢10¢

American Trackless. 33¢@21¢

Wilcox Mfg. Co.: 60¢@10¢

Blake Roller Bearing. 60¢@10¢

C. J. Roller Bearing. 60¢@10¢

Cycle Ball Bearing. 50¢

Dwarf Ball Bearing. 60¢@10¢

Ives, Wood Track. 60¢@10¢

L. T. Roller Bearing. 60¢@10¢5¢

New Era Roller Bearing. 50¢@10¢

O. K. Roller Bearing. 60¢@10¢5¢

Prindle, Wood Track. 60¢

Richards' Wood Track. 60¢

Richards' Steel Track. 60¢@10¢

Seeger's Roller Bearing. 60¢@10¢

Tandem Nos. 1 and 2. 60¢

Underwriters' Roller Bearing. 40¢

Wilcox Auditorium Ball Bearing. 30¢

Wilcox Barn Trolley No. 123. 40¢

Wilcox Fire Trolley. 40¢

Wilcox Le Roy Noiseless Ball Bearing. 40¢

Wilcox New Century. 50¢@10¢10¢

Wilcox Trolley Ball Bearing. 40¢

Harness Menders—See Menders.**Harness Snaps—See Snaps.****Hatches—**

Best Brands. 40¢@10¢50¢

Cheaper Brands. 50¢@10¢50¢10¢5¢

Note.—Net prices often made.

Hay and Straw Knives—See Knives.**Hinges—****Blind and Shutter Hinges—**

Surface Gravity Locking Blind:
 (Victor; National; 1838 O. P.;
 Niagara; Clark's O. P.; Clark's
 Tip; Buffalo).
 No. 1 3 5 6
 Doz. pair. \$0.75 1.35 2.60

Mortise Shutter:
 (L. & P., O. S., Dixie, &c.).
 No. 1 1½ 3 4
 Doz. pair. \$0.65 .60 .55 .47

Mortise Reversible Shutter, (Buffalo, &c.).
 No. 1 1½ 3 4
 Doz. pair. \$0.65 .60 .55 .47

Parker. 70¢@75¢

North's Automatic Blind Fixtures, No. 2, for Wood. \$9.00; No. 3, for Brick. \$11.50

Reading's Gravity. 75¢@10¢

Sargent's, Nos. 1, 3, 5. 60¢@10¢

Sargent's, Nos. 11 & 13. 70¢@10¢

Wrightsville Hardware Co.: 80¢@25¢

Stanley's Steel Gravity Blind Hinges.

Doz. sets \$1.20. 20¢@10¢

Gate Hinges—

Clark's or Shepard's—Doz. sets:
 No. 1 2 3
 Hinges with Latches. \$1.90 2.50 4.25

Hinges only. 1.30 1.55 3.20

Latches only. 0.70 0.70 1.20

New England:

With Latch.doz. \$1.75@1.80

Without Latch.doz. \$1.40@1.45

Reversible Self-Closing:
 With Latch.doz. \$1.65@1.75

Without Latch.doz. \$1.50@1.55

Western:

With Latch.doz. \$1.60@1.65

Without Latch.doz. \$1.00@1.05

Wrightsville Hardware Co.: 20¢

Shepard's or Clark's, Nos. 1 & 2. 65¢@75¢

Shepard's or Clark's, No. 3. 55¢@5¢

Spring Hinges—

Holdback, Cast Iron, gro. \$2.00@10.00

Non-Holdback, Cast Iron. gro. \$7.00@7.50

J. Bardsley

Bardsley's Patent Checking. 15¢

Boumer Bros.: 33¢45

Chicago Spring Butt Co.: 20¢

Chicago. 20¢

Floor Hinge. 40¢

Garden City Engine House. 20¢

Keene's Saloon Door. 20¢

Triple End. 40¢

Coleman Hdw. Co.: \$10.00

Champion Holdback. gr. \$10.00

J. G. C. gr. \$8.50

Nickel. gr. \$9.00

Lawson Mfg. Co.: 30¢

Matchless. 35¢

Pavson Mfg. Co.: 50¢@50¢5¢

Oblique, Dbl. Acting. 50¢@50¢5¢

Stover Mfg. Co.: Ideal, No. 16, Detachable. gr. \$12.50

Ideal, No. 4. gr. \$8.00

New Idea No. 1. gr. \$9.00

New Idea, Double Acting. 45¢

Van Wagoner & Williams Hdw. Co.: 30¢

Acme, Wrt. Steel. 30¢

Acme, Brass. 20¢

American. 30¢

Columbia. gr. \$8.00

Columbia, No. 18. gr. \$25.00

Columbia, Adjustable. 30¢

Gem, new list. . . .

Ladies—Melting—
 L. & W. Co. 60%
 P. & W. 40%
 Heading 50%
 Sargent 40%
Lanterns—Tubular—
 Regular Tubular, doz. \$4.50 @ 5.00
 Side Lift Tubular, doz. \$4.75 @ 5.25
 Square Lift Tubular, doz. \$4.75 @ 5.25
 Other styles, doz. \$4.10 @ 4.50
Bull's Eye Police—
 3 1/2-inch flash light, doz. \$3.50 @ 3.75
 3-inch flash light, doz. \$4.00 @ 4.25
 2 1/2-inch regular, doz. \$3.25 @ 3.50
 3-inch regular, doz. \$3.50 @ 3.75
Latches, Thumb—
 Roggin's Latches, doz. \$2 @ 3.30
Lawn Mowers—
 See Mowers, Lawn.
Leaders, Cattle—
 Small, doz. 45c; large, 55c
 Covert Mfg. Co. 45c
Lemon Squeezers—
 See Squeezers, Lemon.
Lifters, Transom—
 Dickson:
 3 x 4 ft. 100 \$11.00
 Other sizes 70%
 Other size, Brass and Bronze, 70%
 Excelsior, 60%
 Payson's:
 Solid Grip Nos. 643 and 644, doz. \$1.00
 Bronzed Iron, 70%
Lines—
 Wire Clothes, Nos. 18 19 20
 100 feet, \$2.50 2.25 1.70
 75 feet, \$1.80 1.70 1.50
 Osawan Mills:
 Crown Solid Braided Chalk, 33%
 Mason's, No. 0 to No. 5, 33%
 Sam-on Cordage Works:
 Solid Braided Chalk, No. 0 to 3, 40%
 Silver Lake Braided Chalk, No. 0, 86.00;
 No. 1, \$6.50; No. 2, \$7.00; No. 3, \$7.50
 per gr. 30%
Locks, &c.—Cabinet—
 Cabinet Locks, 35% @ 33%
Door Locks, Latches, &c.—
 [Net prices are very often made on these goods.]
 Reading Hardware Co., 40%
 H. & E. Mfg. Co., 70%
 Sargent & Co., 40%
 Slaymaker-Harry Co., 30%
 Snow's Victor, 50%
Elevator—
 Stowell's, 33%
Padlocks—
 Wrought Iron, list Dec. 3, '97, 75%
 Dog Collar, S. B. Co., 40%
 R. & M. Mfg. Co. Wrt Steel & Brass, 50%
 S. B. & Co., 40%
Sash, &c.—
 Fitch's Bronze and Brass, 60%
 Fitch's Iron, 70%
 Ives' Patent, 55%
 Oedinger's Anti-rattle, 50%
 Payson's Perfect, 70%
 Payson's Signal (new list), 75%
 Reading, 60%
Machines—
Boring—
 Without Augers.
 Upright. Angular.
 Improved No. 3, \$4.25 No. 1 \$5.00
 Improved No. 4, 3.75 No. 2 3.38
 Improved No. 5, 2.75
 Jennings, 2.50
 Miller's Falls, 6.75
 Enell's, Hice's Pat. 2.50
 Swan's, No. 500, 5.10 No. 200 6.45
Holisting—
 Moore's Anti-Friction Differential Pulley Block, 30%
 Moore's Hand Hoist, with Lock Brake, 20%
Ice Cutting—
 Chandler's, 15%
Washing—
 Wayne American, doz. \$23.00
 Western Star, No. 2, doz. 28.00
 Western Star, No. 3, doz. 30.00
 St. Louis, No. 41, doz. 30.00
Mallets—
 Hickory, 45%
 Lignumvite, 45%
 Tinnars', Hickory and Applewood, doz. 50%
 Fibre Head Stearns', 30%
Mats—
 Door—
 Elastic Steel (W. O. Co.), 10%
Mattocks—
 See Picks and Mattocks.
Meat Cutters—
 See Cutters, Meat.
Milk Cans—
 See Cans, Milk.
Mills—Coffee—
 Box and Side, list Jan. 1, '88, 50%
 Net prices are often made on some goods which are lower than above discounts.
 Enterprise Mfg. Co., 25%
 National, list Jan. 1, '94, 30%
 Parker's Columbian and Victoria, 50%
 Parker's Box and Side, 50%
 Swift, Lane Bros., 30%
Mining Knives—
 See Knives, Mining.
Molasses Cates—
 See Gates, Molasses.
Money Drawers—
 See Drawers, Money.

Mowers, Lawn—

Net prices are generally quoted.
 Cheap, all sizes, \$2.00
 Good, all sizes, \$2.50 @ 2.75
 10 12 14 16-inch
 High Grade L 25 4.50 4.75 5.00
 Pennsylvania and Continental 60%
 Quaker City, 70%
 Great American, 70%
 P. Haden, 70%
 Styles M. S. C. K. T., 70%
 Style A, all Steel, 60%
 Style E, Low Wheel, 60%
 Style E, High Wheel, 70%
 Drexel and Gold Coin, low list, 50%
Nails—
 Cut and Wire. See Trade Report.
 Wire Nail and Brads, Papered.
 List July 30, 1899, 85%
 Hungarian, Finishing, Upholsterers', &c. See Tacks.
Horse—
 Nos. 6 7 8 9 10
 A. C. 25% 23% 22% 21% 21%
 Capewell, 19% 18% 17% 16% 16%
 C. B. K., 25% 25% 22% 21% 21%
 Champlain, 28% 26% 25% 24% 23%
 Mand S., 25% 23% 22% 21% 21%
 Newson, 23% 21% 20% 19% 18%
 Putnam, 23% 21% 20% 19% 18%
 Standard, 23% 21% 20% 19% 18%
 Star, 23% 21% 20% 19% 18%
 Vulcan, 23% 21% 20% 19% 18%
Picture—
 1 1/2 2 2 1/2 3 3 1/2 in.
 Brass Head, 45 60 70 95 1.00 gro.
 Por. Head, 1.10 1.10 1.10 gro.
Nippers, See Pliers and Nippers.
Nut Crackers—
 See Crackers, Nut.
Nuts—
 List Feb. 1, '99.
 Cold Punched, Off
 Mfrs. or U. S. Standard, list
 Hexagon, plain, 40%
 Square, plain, 40%
 Square, C. T. & R., 40%
 Hexagon, C. T. & R., 40%
 Hot Pressed:
 Mfrs., U. S. or Nar. Gauge Stan'd.
 Square, 50%
 Hexagon, 50%
 Note.—Tapped Nuts are now 2-10c higher than above.

Nails—

Cut and Wire. See Trade Report.
 Wire Nail and Brads, Papered.
 List July 30, 1899, 85%
 Hungarian, Finishing, Upholsterers', &c. See Tacks.

Horse—

Nos. 6 7 8 9 10
 A. C. 25% 23% 22% 21% 21%
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Picture—

1 1/2 2 2 1/2 3 3 1/2 in.
 Brass Head, 45 60 70 95 1.00 gro.
 Por. Head, 1.10 1.10 1.10 gro.

Nippers, See Pliers and Nippers.

Nut Crackers—

See Crackers, Nut.

Nuts—

List Feb. 1, '99.
 Cold Punched, Off
 Mfrs. or U. S. Standard, list
 Hexagon, plain, 40%
 Square, plain, 40%
 Square, C. T. & R., 40%
 Hexagon, C. T. & R., 40%
 Hot Pressed:
 Mfrs., U. S. or Nar. Gauge Stan'd.
 Square, 50%
 Hexagon, 50%
 Note.—Tapped Nuts are now 2-10c higher than above.

Oakum—

Best or Government, lb. 64c
 Navy, lb. 5 c
 U. S. Navy, lb. 54c
 Plumbers' Spun Navy, lb. 3 c
 In carload lots 1/4 lb. off f.o.b. New York.

Oil, Axle—

Snow Flake:
 1 pt. cans, per doz. \$3.00
 1 qt. cans, per doz. \$4.80
 1 gal. cans, per doz. \$15.00
 5 gal. cans, per doz. \$66.00

Oil Tanks—See Tanks, Oil.

Oilers—

Brass and Copper, 40%
 Tin or Steel, 60%
 Zinc, 60%
 Malleable, Hammers Improved, No. 1, \$3.60; No. 2, \$4; No. 3, \$4.40
 Malleable, Hammers' Old Pattern, same list, 50%
 Wilmot & Hobbs Mfg. Co.:
 Spring Bottom Cans, 70%
 Railroad Oilers etc., 60%

Oponers—

Can—
 French, doz. 55c
 Iron Handle, doz. 25c
 Sprague, Iron Hdl., per doz. 35c
 Sargine Scissors, doz. \$1.75 @ \$2.00
 Tip Top, per doz. \$1.75 @ \$2.00
 National, per doz. \$1.75 @ \$2.00
 Stowell's, per doz. 40c
 Waldorf, per doz. \$9.00

Egg—

Nickel Plate, per doz. \$2.00
 Silver Plate, per doz. \$4.00

Packing—

Rubber—
 Standard, fair quality, 70%
 Inferior quality, 75%
 Extra, 60%
 Jenkins' Standard, 80%
 Miscellaneous—
 American Packing, 9%
 Cotton Packing, 15%
 Italian Packing, 10%
 Jute, 5%
 Russia Packing, 12%

Pails—

Creamery—
 B. S. & Co., with gauges, No. 1 \$6.50;
 No. 2, \$6.75 per doz.
 Galvanized—
 Price per gro.
 Inch. 10 12 14
 Water, Regular, 18 20 22
 Water, Heavy, 22 24 26
 Fire, Rd. Bottom, 31 33 35
 Well, 27 29 31

Pans—

Dripping—
 Standard List, 60%

Fry—

Standard List, 75%
 Roasting and Baking—
 Regal, S. S. & Co., doz. Nos. 5, \$4.50;
 10 \$5.00; 20 \$5.50; 30 \$6.00
 Simplex, per gro. No. 40 \$30.00; 50, \$34.50; 60 \$39.00; 140, \$33.00; 150, \$37.50; 160, \$43.00.
Paper—
Building Paper—
 Per roll
 Rosin Sized Sheathing: 500 sq. ft.
 Light wt., 20 sq. ft. to lb. \$0.40 @ 0.45
 Medium wt., 12 sq. ft. to lb. \$0.50 @ 0.55
 Heavy wt., extra quality, \$0.55 @ 0.65
 Medium Grades Water Proof Sheathing, \$0.80 @ 1.25
 Deafening Felt, 9, 6 and 4 1/2 sq. ft. to lb., ton \$40.00
 York Haven Waterproof Sheathing, \$1.35 @ 1.75
Tarred Paper.
 1 ply (roll 300 sq. ft.), ton \$28.00
 2 ply, roll 100 sq. ft. 50c
 3 ply, roll 100 sq. ft. 80c
Sand and Emery—
 List Dec. 25, 1899, 50%
Parers—
Apple—
 Advance, doz. \$4.50
 Baldwin, doz. \$5.00
 Bonanza, each \$5.00
 Dandy, each \$7.50
 Eureka, 1008, each \$16.00
 Family Bay State, doz. \$12.00
 Hudson's Little Star, doz. \$4.00
 Hudson's Rocking Table, doz. \$5.50
 Improved Bay State, doz. \$27.00 @ 30.00
 New Lightning, doz. \$5.50
 Reading 72, doz. \$4.00
 Reading 78, doz. \$7.00
 Turn Table, doz. \$5.50
 White Mountain, doz. \$4.00
Potato—
 Saratoga, doz. \$5.50
 White Mountain, doz. \$4.50
Picks and Mattocks—
 List Feb. 25, 1899, 75%
Pinking Irons—
 See Irons, Pinking.
Pins—
Escutcheon—
 Brass, 60%
 Iron, list Nov. 11, '85, 60%
Pipe, Cast Iron Soil—
 Factory Shipments.
 Standard, 2-6 in., 70%
 Extra Heavy, 2-6 in., 75%
 Fittings, 75%
Pipe, Merchant, Boiler Tubes, &c.—
 Carloads to Consumers.
 Merchant Pipe.
 Black. Galvanized.
 1/4 to 1/2 inch, 61% 48%
 3/4 to 10 inch, 63% 56%
 Boiler Tubes.
 Steel. 22 feet and over.
 1 to 1 1/2 inch and 2 1/2 in 51% 50%
 1 1/2 to 2 1/2 inch, 51% 47%
 2 1/2 to 13 inch, 63% 53%
 Iron.
 1 to 1 1/2 inch and 2 1/2 in 53% 49%
 1 1/2 to 2 1/2 inch, 49% 44%
 2 1/2 to 13 inch, 60% 55%
 Casing. S. & S.
 1 to 2 inch, 60%
 2 1/2 to 4 inch, 60%
 4 1/2 to 12 1/2 inch, 61%
 Note.—The old list is still used by some jobbers, and net prices are often quoted.

Roasting and Baking—

Regal, S. S. & Co., doz. Nos. 5, \$4.50;
 10 \$5.00; 20 \$5.50; 30 \$6.00
 Simplex, per gro. No. 40 \$30.00; 50, \$34.50; 60 \$39.00; 140, \$33.00; 150, \$37.50; 160, \$43.00.

Paper—

Building Paper—
 Per roll
 Rosin Sized Sheathing: 500 sq. ft.
 Light wt., 20 sq. ft. to lb. \$0.40 @ 0.45
 Medium wt., 12 sq. ft. to lb. \$0.50 @ 0.55
 Heavy wt., extra quality, \$0.55 @ 0.65
 Medium Grades Water Proof Sheathing, \$0.80 @ 1.25
 Deafening Felt, 9, 6 and 4 1/2 sq. ft. to lb., ton \$40.00
 York Haven Waterproof Sheathing, \$1.35 @ 1.75

Tarred Paper.

1 ply (roll 300 sq. ft.), ton \$28.00
 2 ply, roll 100 sq. ft. 50c
 3 ply, roll 100 sq. ft. 80c

Sand and Emery—

List Dec. 25, 1899, 50%

Parers—

Apple—
 Advance, doz. \$4.50
 Baldwin, doz. \$5.00
 Bonanza, each \$5.00
 Dandy, each \$7.50
 Eureka, 1008, each \$16.00
 Family Bay State, doz. \$12.00
 Hudson's Little Star, doz. \$4.00
 Hudson's Rocking Table, doz. \$5.50
 Improved Bay State, doz. \$27.00 @ 30.00
 New Lightning, doz. \$5.50
 Reading 72, doz. \$4.00
 Reading 78, doz. \$7.00
 Turn Table, doz. \$5.50
 White Mountain, doz. \$4.00

Potato—

Saratoga, doz. \$5.50
 White Mountain, doz. \$4.50

Picks and Mattocks—

List Feb. 25, 1899, 75%

Pinking Irons—

See Irons, Pinking.

Pins—

Escutcheon—

Brass, 60%
 Iron, list Nov. 11, '85, 60%

Pipe, Cast Iron Soil—

Factory Shipments.

Standard, 2-6 in., 70%
 Extra Heavy, 2-6 in., 75%
 Fittings, 75%

Pipe, Merchant, Boiler Tubes, &c.—

Carloads to Consumers.

Merchant Pipe.

Black. Galvanized.

1/4 to 1/2 inch, 61% 48%
 3/4 to 10 inch, 63% 56%

Boiler Tubes.

Steel. 22 feet and over.

1 to 1 1/2 inch and 2 1/2 in 51% 50%
 1 1/2 to 2 1/2 inch, 51% 47%
 2 1/2 to 13 inch, 63% 53%
 Iron.
 1 to 1 1/2 inch and 2 1/2 in 53% 49%
 1 1/2 to 2 1/2 inch, 49% 44%
 2 1/2 to 13 inch, 60% 55%

Casing. S. & S.

1 to 2 inch, 60%
 2 1/2 to 4 inch, 60%
 4 1/2 to 12 1/2 inch, 61%

Note.—The old list is still used by some jobbers, and net prices are often quoted.

Planes and Plane Irons—

Wood Planes—

Molding, 40%
 Bench, First quality, 45%
 Bench, Second quality, 45%
 Bailey's (Stanley R. & L. Co.) 50%
 Gage Self Setting, 35%

Iron Planes—

Bailey's (Stanley R. & L. Co.), 50%
 Chaplin's Iron Planes, 50%
 Miscellaneous Planes (Stanley R. & L. Co.), 25%
 Sargent's, 50%

Plane Irons—

Wood Bench Plane Irons, 35%
 Buck Bros., 30%
 Stanley R. & L. Co., 50%
 L. & J. White, 20%

Planters, Corn, Hand.

Kohler's Eclipse, doz. \$9.00

Plates—

Felloe, doz. \$3.40
 Self-Sealing Pie Plates (S. S. & Co.), doz. \$2.00

Pliers and Nippers—

Button Pliers, 65%
 Gas Burner, per doz., 5 in., \$1.15 @ \$1.20; 6 in., \$1.35 @ \$1.45
 Gas Pipe, 7 8 10 12-in. \$1.75 \$2.00 \$2.75 \$3.75

Acme Nippers.

Bernard's, 40%
 Parallel Pliers, &c., 30%
 Paragon Pliers, 30%
 Lodi Pliers, 30%
 Elm City Fence Pliers, 30%
 Crown Hanger Co.:
 'Iron's', 40%
 Improved Button, 70%
 Stub's, 30%
 Combination and others, 30%
 Heller's Farriers' Nippers, Pincers, and Tools 50%
 Morrill's Parallel, doz. \$12.00
 P. S. & W. Cast Steel, 30%
 P. S. & W. Tinnars' Cutting Nippers, 40%

Swedish Side, End and Diagonal Cutting Pliers.

Utica Drop Forge & Tool Co., 50%
 Pliers and Nippers, all kinds, 40%

Plumbs and Levels—

Plumbs and Levels, 70%

Davis Iron, Machinist Nos. 1 to 14, 25%
 Davis Iron, Adjustable Nos. 6 to 14, 25%
 Diaston's, 70%
 Pocket Levels, 70%
 Stanley R. & L. Co., 70%

Stanley's Duplex, 25%
 Woods' Extension, 33%

Poachers, Egg—

Buffalo Steam Egg Poachers, No. 3, No. 1, \$2.30; No. 2, \$1.10; No. 3, \$1.10; No. 4, \$1.45.

Points, Glaziers—

Bulk and 1 lb. papers, lb. 9 1/4 @ 10 c
 1/2 lb. papers, lb. 10 @ 11 c
 1/4 lb. papers, lb. 10 1/2 @ 11 c

Pokes, Animal—

Ft. Madison, Western, doz. \$3.75

Police Coods—

Manufacturers' Lists, 25%
 Tower's, 25%

Polish—Metal—

Prestoline Liquid, No. 1 (1/4 pt.), doz. \$3.00; No. 2 (1 qt.), \$9.75

Prestoline Paste, 33%
 U. S. Metal Polish Paste, 3 oz. boxes, doz. 50c; 5 oz. boxes, doz. \$4.50; 1 lb. boxes, doz. \$1.25; 1 lb. boxes, doz. \$2.25
 U. S. Liquid, 3 oz. cans, doz. \$1.25; 5 oz. cans, doz. \$1.25
 Barkeepers' Friend Metal Polish, doz. \$1.75; 5 oz. \$1.80
 Wynn's White Silk, 1/4 pt. cans, doz. \$1.50

Stove—

Black Eagle Benzine Paste, 5 lb. cans, doz. \$10.00

Black Eagle, Liquid, 1/4 pt. cans, doz. \$10.00

Black Jack Paste, 5 lb. cans, doz. \$10.00

Ladd's Black Beauty, gr. \$10.00

Joseph Dixon's, gr. \$5.75

Dixon's Plumbago, 1 lb. boxes, doz. \$2.50

Fireside, 1 lb. boxes, doz. \$2.50

Gem, gr. \$4.50

Japanese, 1 lb. boxes, doz. \$3.50

Jet Black, 1 lb. boxes, doz. \$3.50

Peerless Iron Enamel, 1/4 pt. cans, doz. \$1.50

Wynn's Black Silk, 5 lb. pail, each \$1.50

Wynn's Black Silk, 5 oz. box, doz. \$1.00

Wynn's Black Silk,

Pulleys—
Hay Fork, Swivel or Solid Eye..... doz. \$1.50@1.75
Wheel, # doz. \$1.20@1.30
Hot House, A. W. & Co., 60@80@100
Japanned Clothes Line..... 60@80@100
Japanned Screw..... 70@10@100
Japanned Side..... 70@10@100
Stowell's Ceiling or End, Anti-Friction 60@
Stowell's Dumb Walter, Anti-Friction..... 60@
Stowell's Electric Light..... 60@
Stowell's Side, Anti-Friction..... 60@100
Sash Pulleys—
Acme..... 1 1/2 in., 1 1/2; 2 in., 1 1/2
Common Sense, 1 1/2 in., 1 1/2; 2 in., 1 1/2
Empire..... 1 1/2 in., 1 1/2; 2 in., 1 1/2
Fox-All-Steel, Nos. 3 and 7, 2 1/2 in., 1 1/2
No. 9, 1 1/2 in., 1 1/2; 2 in., 1 1/2
Extra for Plated Finish..... doz. 20¢
Extra for Anti-Friction Bronze..... doz. 10¢
Bushings..... doz. 10¢
Grand Rapids Steel No. 10..... 40¢
Ideal No. 13..... 1 1/2 in., 1 1/2; 2 in., 1 1/2
Improved..... 1 1/2 in., 1 1/2; 2 in., 1 1/2
Niagara..... 1 1/2 in., 1 1/2; 2 in., 1 1/2
No. 26, Troy..... 1 1/2 in., 1 1/2; 2 in., 1 1/2
Star..... 1 1/2 in., 1 1/2; 2 in., 1 1/2
Tie Blocks—See Blocks.
Pumps—
Cistern..... 60@60¢10¢
Pitcher Spout..... 75¢10¢10¢
Pump Leathers, all sizes..... gro. \$6.00
Barnes Dbl Acting (low list)..... 50¢
Flint & Walling's Fast Mail..... 55¢55¢10¢
Flint & Walling's Pitcher Spout..... 75¢55¢
Loud's Suction Pumps, U. S. Co., 20¢
Nyer's Pumps, low list..... 50¢
Contractors' Rubber Diaphragm Non-chokable, B. & L. Block Co., 20¢
Punches—
Revolving (4 tubes)..... doz. \$3.75@4.25
Saddlers' or Drive, good..... doz. 65¢70¢
Spring, good quality..... \$1.65@1.75
Bemis & Call Co.'s Cast Steel Drive..... 50¢
Bemis & Call Co.'s Check..... 55¢
Bemis & Call Co.'s Spring..... 50¢
Niagara Solid Punches..... 45¢
Steel Screw, H. & K. Mfg. Co., 40¢
Tinners' Hollow, P. S. & W. Co., 35¢33¢35¢
Tinners' Solid, P. S. & W. Co., 55¢
Rail—
Barn Door, Light..... In. 1/2 5¢ 3/4 100 feet..... \$2.00 \$2.50 \$3.00
B. D., for N. E. Hangers:
100 feet..... \$2.20 2.70 3.20
Sliding Door, Bronzed Wrt Iron..... ft. 6 1/4
Sliding Door, Iron Painted..... 2 1/2@3¢
Sliding Door, Wrought Brass, 1 1/2 in., 1 1/2..... 35¢. 50¢
Cronk's Double Braced Steel Rail, 1/2 foot..... 8 1/4¢
Cronk's O. N. T. Rail..... 8 1/4¢
Lanes' O. N. T., 100 ft., 1 inch..... \$2.90
Lanes' Standard, 100 feet..... 3.75
Lawrence Bros., 100 feet..... ft. 4 1/4
McKinney's None Better..... ft. 3 1/4
McKinney's Standard..... ft. 3 1/4
Moore's Wrt. Bracket, Steel..... 3 1/4¢
Stowell's Steel Rail, Plain..... 15¢
Rakes—
Sept. 1, 1900, List:
Cast Steel..... 70¢55¢5¢
Malleable..... 70¢70¢10¢
Lawn Rakes, Metal Head, per doz., 20 teeth, \$3.25; 24 teeth, \$3.50
Fort Madison Red Head Lawn..... \$3.25
Fort Madison Blue Head Lawn..... \$3.00
Jackson Lawn, 20 and 30 teeth..... doz. \$1.50
Kohler's Lawn Queen, 24-tooth, 1/2 doz. \$4.00
Kohler's Paragon, 24-tooth, 1/2 doz. \$3.00
Kohler's Steel Garden, 14-tooth, 1/2 doz. \$3.50
Kohler's Malleable Garden, 14-tooth, 1/2 doz. \$2.50
Rasps, Horse—
Dialton's..... 75¢
Heller Bros..... 60¢10¢10¢
McCaffrey File Co. Horse Rasps..... 60¢10¢10¢
New Nicholson Horse Rasp..... 70¢10¢
See also Files.
Razors—
Fox Razors, No. 42... doz. \$20.00
Fox Razors, No. 44... doz. \$24.00
Fox Razors, No. 52, Platina, 1/2 doz. \$24.00
Sterling Razor Works..... 50¢
Razor Straps—
See Straps, Razor.
Reels—Fishing—
Hendryx Aluminum, German Silver, Gold, Bronze, Silver, Rubber, Popolo and Salmon, Single Action, Multiplying and Quadruple, all sizes..... 25¢
Hendryx Single Action Series, 102P and PN, 202P and PN, 102 PR and PRN, 202 PR and PRN, 304 P and PN, 00304P and PN, 502 and 502N, 802 and 802N, 02084N, Competitor, 50¢
Hendryx Multiplying and Quadruple Series, 3004N and PN, 4N and PN, 2904N, 2904P and PN, 002904N, 002904P and PN, 5009N and PN, 40¢10¢
Shakespeare, Style C..... 25¢
Registers—
Black Jap..... 50¢50¢10¢
White Jap..... 50¢50¢10¢
Bronzed..... 50¢
Nickel Plated..... 50¢
Electro Plated..... 50¢
Riddles, Grain or Sand—
16 in. per doz..... \$3.00@3.25
17 in. per doz..... \$2.25@2.50
15 in. per doz..... \$2.50@2.75
Rings and Ringers—
Bull Rings—
Steel..... \$0.75 0.83 0.88 doz.
Copper..... 1.10 1.20 1.50 doz.
Hog Rings and Ringers—
Hog's Rings..... gro. boxes, \$1.50@2.00

Hill's Ringers, G. L..... doz. 75¢
Blair's Ringers..... gr. \$5.75@6.00
Blair's Ringers..... doz. \$0.90@1.00
Brown's Ringers..... gr. \$1.00@1.10
Brown's Ringers..... doz. \$1.25@1.35
Perfect Ringers..... gr. \$0.80
Rapid Ringers..... doz. \$3.50
Rivets and Burrs—
Copper..... 50¢50¢5¢
Iron or Steel..... 70¢70¢10¢
Miscellaneous..... 70¢70¢10¢
Rivet Sets—See Sets.
Roasting and Baking Pans—See Pans, Roasting and Baking.
Rollers—
Acme Stowell's Anti-Friction..... 50¢
Parn Door, Sargent's list..... 50¢10¢5¢
Cronk's Stay..... 40¢
Cronk's Granderhoff..... 33¢
Lane's Stay..... 33¢
Stowell's Barn Door Stay..... doz. \$1.25
Rope—
Manila, 7-16 in. and larger..... lb. 9 @ 9 1/4¢
Manila, 1/4 and 5-16 in. lb. 10 @ 10 1/4¢
Manila, Tarred Rope, 15 lb. 9 @ 9 1/4¢
Manila Hay Rope Med'm lb. 9 @ 9 1/4¢
Sisal, 7-16 in. and larger, lb. 6 @ 6 1/4¢
Sisal, 1/4 and 5-16 in. lb. 6 1/4 @ 7 ¢
Sisal, Hay Rope, 2 to 10 ply..... lb. 6 @ 6 1/4¢
Sisal, Tarred, Medium Lath Yarn..... lb. 5 1/2 @ 5 1/4¢
Cotton Rope:
Best, 1/4-in. and larger..... lb. @ 13 ¢
Med'm, 1/4-in. and larger..... lb. @ 11 1/4¢
Com., 1/4-in. and larger..... lb. @ 8 1/4¢
Jute Rope, No. 1, 1/4 in. and up..... lb. @ 6 ¢
Jute Rope No. 2, 1/4 in. and up..... lb. @ 5 1/4¢
Jute Rope No. 3, 1/4 in. and up..... lb. @ 4 3/4¢
Wire Rope—
Galvanized..... 30¢2 1/2¢2 1/2¢
Plain..... 35¢2 1/2¢2 1/2¢
Ropes, Hammock—
Covert Mfg. Co..... 45¢2¢
Covert Saddlery Works..... 60¢
Rules—
Bozwood..... 75¢10¢10¢10¢75¢10¢10¢
Ivory..... 40¢10¢10¢10¢10¢10¢10¢
Luffkin's Steel..... 50¢10¢
Luffkin's Lumber..... 50¢10¢
Stanley R. & L. Co.:
Boxwood..... 75¢10¢10¢75¢10¢10¢10¢
Ivory..... 35¢10¢35¢10¢10¢
Sad Irons—See Irons, Sad.
Sand and Emery Paper and Cloth—
See Paper and Cloth.
Sash Cords—See Cord, Sash.
Sash Locks—See Locks, Sash.
Sash Weights—
See Weights, Sash.
Sausage Stuffers or Fillers—See Stuffers or Fillers, Sausage.
Saw Frames—
See Frames, Saw.
Saw Sets—See Sets, Saw.
Saw Tools—See Tools, Saw.
Saws—
Atkins' Circular..... 50¢50¢10¢
Atkins' Band..... 50¢10¢10¢
Atkins' Cross Cuts..... 35¢5¢
Atkins' Mulay, Mill and Drag..... 50¢10¢
Atkins' One-Man Saw..... 40¢
Atkins' Wood Saws..... 40¢
Atkins' Hand, Compass, &c..... 40¢
Dialton's Circular Solid and Inserted Tooth..... 50¢
Dialton's Hand 12 to 14 in. wide..... 60¢
Dialton Band 1/4 to 1 1/2..... 70¢
Dialton Crosscuts..... 45¢45¢10¢
Dialton Narrow Crosscuts..... 50¢50¢10¢
Dialton Mulay, Mill and Drag..... 50¢
Dialton Framed Woodsaws, 35¢35¢7 1/2¢
Dialton Woodsaw Blades..... 40¢40¢7 1/2¢
Dialton Woodsaw Rods..... 25¢
Dialton Hand Saws, Nos. 12, 99, 9 1/2, 1100, Ds, 120, 79, 72, &c..... 25¢25¢7 1/2¢
Dialton Hand Saws, Nos. 7, 107, 10 1/2, 3, 1, 0, 00, Combination..... 30¢30¢7 1/2¢
Dialton Compass Keyhole & 25¢25¢7 1/2¢
Dialton Butcher Saws and Blades..... 35¢35¢7 1/2¢
C. E. Jennings & Co.'s:
Butcher Saws..... 25¢
Butcher Saws..... 35¢
Compass and Key Hole Saws..... 25¢
Framed Wood Saws..... 40¢
Hand Saws..... 25¢30¢
Wood Saw Blade..... 45¢
Peace Circular and Mill..... 50¢
Peace Cross Cuts, list Jan. 1, '99..... 50¢
Peace Hand, Panel and Rip..... 50¢
Richardson's Circular and Mill..... 50¢
Richardson's X Cuts, list Jan. 1, '99..... 50¢
Richardson's Hand &c..... 30¢
Simonds' Circular Saws..... 50¢
Simonds' Crescent Ground Cross Cut Saws..... 35¢
Simonds' One-Man Cross Cuts..... 40¢10¢
Simonds' Gang Mill, Mulay and Drag Saws..... 45¢45¢3¢
Hack Saws—
Dialton Concave Blades..... 25¢
Dialton Keystone..... 30¢
Dialton Hack Saw Frames..... 30¢

C. E. Jennings & Co's:
Hack Saw Frames, Nos. 175, 180, 330..... 40¢
Hack Saws, Nos. 175, 180, 330, complete..... 40¢
Griffin's Hack Saw Frames..... 40¢
Griffin's Hack Saw Blades..... 45¢
Stall's Hack Saws and Blades..... 15¢10¢
Scroll—
Barnes No. 7, 2 1/2..... 25¢
Barnes Scroll Saw Blades..... 40¢
Barnes Velocipede Power Scroll Saw, without boring attachment, \$18 with boring attachment, \$20..... 20¢
Lester, complete, \$10.00..... 15¢10¢
Rogers, complete, \$4.00..... 15¢10¢
Scale Beams—
See Beams, Scale.
Scales—
Family, Turnbult's..... 30¢30¢10¢
Hatch, Counter:
Platform, 1 lb. by 1/4 oz..... doz. \$5.75
Two Platforms, 8 lb. by 1/4 oz..... doz. \$14.00
Union Platform, Plain..... \$1.75@2.00
Union Platform, Striped..... \$1.85@2.15
Chattillon's Eureka..... 25¢
Chattillon's Favorite..... 40¢
Chattillon's Grocers' Trip Scales..... 50¢
Petouse Scales—Household, Counting, Conference, Postal, 10¢ &c..... 5¢
"The Standard" Portables..... 45¢
"The Standard" R. R. and Wagon..... 50¢
Scrapers—
Box, 1 Handle..... doz. \$2.25@2.75
Box, 2 Handle..... doz. \$3.75@4.00
Ship, No. 1, doz. \$3.50; No. 2..... \$2.50@2.75
Adjustable Box Scraper (S. R. & L. Co.)..... \$6.00
Foot, W. E. Pratt Mfg. Co..... 30¢10¢
Foot, W. E. Pratt Mfg. Co..... 30¢10¢
Screens, Window and Frames—
Romania Window Screens..... 50¢10¢2¢
River Pattern Window Screen..... 50¢10¢2¢
Maine Window Screen Frames 40¢10¢5¢
Phillips' Window Screen Frames..... 60¢
Porter's Extension Window Screens..... 50¢10¢
Wahash Spring Adl. Screen..... 50¢
Screw Drivers—
See Drivers, Screw.
Screws—
Bench and Hand—
Bench, Iron, doz. 1 in., \$3.00@3.25; 1 1/4, \$3.50@3.75; 1 1/2, \$4.00@4.50
Bench, Wood, Beech, doz. \$3.50@3.75
Hand, Wood..... 35¢
Hand, Brass, 10¢10¢
Hand, Grad Rapid..... 35¢
Hand, R. H. Mfg. Co..... 35¢
Coach, Lag and Hand Rail—
Lag, Common Point, list Oct. 1, '99..... 75¢10¢10¢
Coach and Lag, Gimlet Point, list Oct. 1, '99..... 75¢10¢
Hand Rail, list Jan. 1, '81, 80¢10¢
Jack Screws—
Millers Falls, Roller..... 50¢10¢10¢
P. S. & W..... 40¢50¢10¢
Sargent..... 40¢50¢10¢
Machine—
List Jan. 1, '98:
Flat or Round Head, Iron, 50¢50¢10¢
Flat or Round Head, Brass..... 50¢50¢10¢
Set and Cap—
Set (Iron or Steel)..... 60¢60¢10¢
Sq. Hd. Cap..... 55¢
Hex. Hd. Cap..... 50¢
Wood—
List Jan. 1, 1900:
Flat Head, Iron..... 80¢
Round Head, Iron..... 75¢
Flat Head, Brass..... 77 1/2¢
Round Head, Brass..... 78 1/2¢
Flat Head, Bronze..... 78 1/2¢
Round Head, Bronze..... 70¢
Drive Screws..... 80¢
Scroll Saws—See Saws, Scroll.
Scythes—
Grass Scythes:
Natural Finish, per doz. \$7.50@7.75
Pol. Blade..... per doz. \$8.07@8.15
Painted or Bronzed, per doz. \$8.00
Weed and Bush..... per doz. \$7.25@7.50
Scythe Snaths—
See Snaths, Scythe.
Seeders—
Raisin—
Enterprise..... 25¢30¢
Sets—
Awl and Tool—
Brad Awl and Tool Sets:
Wood Hdl., 10 Awls doz. \$2.00@2.25
Wood Hdl., 16 Awls, 6 Tools..... doz. \$2.50@2.60
Atkins' Sets, Awl and Tools:
No. 20, 3/4 doz. \$10.00..... 50¢10¢10¢
Fray's Adl. Tool Hdl's, Nos. 1, \$12; 2, \$18; 3, \$12; 4, \$9; 5, \$7..... 50¢
Miller's Adl. Tool Hdl's, Nos. 1, \$12; No. 4, \$12; No. 5, \$18..... 15¢10¢
Stanley's Excelsior:
No. 1, \$7.50; No. 2, \$4.00; No. 3, \$5.50..... 30¢10¢10¢10¢
Garden Tool Sets—
Ft. Madison Rakes, Shovel and Hoe..... doz. \$9.00
Nail—
Round, assorted..... gro. \$1.25@1.75
Octagon..... gro. \$4.25@4.75
Knurled, Good..... gro. \$0.00@0.50
Cannon's Diamond Point, gr. \$1.25
Snell's Corru. ated. Cup Pt..... 50¢
Snell's Knurled, Cup Pt..... 60¢
Rivet—
Regular list..... 70¢70¢10¢5¢
Saw—
Alken's Genuine..... doz. \$5.50@6.00

Alken's Imitation..... doz. \$3.00@3.10
Atkin's Criterion..... 40¢
Atkin's Adjustable..... 40¢
Bemis & Call Co.'s Cross Cut..... 30¢
Bemis & Call Co.'s Plate..... 20¢
Bemis & Call Spring Hammer..... 30¢
Dialton's Star and Monarch..... 25¢
Hammer, Bemis & Call Co.'s new Pat. 4 1/2 Morrill's No. 1, \$15.00..... 40¢20¢
Nos. 3 and 4, Cross Cut, \$23.00, 40¢20¢
No. 5, Mill, \$31.00..... 40¢20¢
No. 10, \$15.00..... 40¢20¢
No. 11, \$16.00..... 40¢20¢
Taintor Positive, 1/2 doz. \$18..... 60¢
Sharpeners, Knife—
Chicago Wheel & Mfg. Co..... 60¢65¢
Taitte Mills, gross, \$14.40..... 25¢33¢
Sharpeners, Skate—
Eureka Skate Sharpener..... 1/2 doz. \$2.00
Shaves Spoke—
Iron..... doz. \$1.00@1.25
Wood..... doz. \$1.75@1.75
Bailey's (Stanley R. & L. Co.)..... 50¢10¢
Gardner's, 1/2 doz. \$0.00..... 15¢10¢
Shears—
C. Iron..... 7 8 9 in.
Best..... \$16.00 18.00 20.00 gro.
Good..... \$15.00 15.00 17.00 gro.
Cheap..... \$5.00 6.00 7.00 gro.
Straight Trimmers, &c.:
Best quality, Jan. 60¢10¢10¢70¢5¢
"Nickel..... 60¢60¢5¢
Fair qual. Jap..... 75¢10¢80¢
"Nickel..... 70¢10¢75¢
Tailors' Shears..... 40¢10¢10¢
Acme Cast Shears..... 40¢40¢5¢
Heinrich's Tailors' Shears..... 40¢40¢5¢
Seymour's, Jan..... 70¢
Seymour's Nickel..... 60¢
Seymour's Tailors' Shears..... 40¢
Wilkinson's Hedge..... 50¢
Wilkinson's Sheep..... 15¢
Tinners' Snips—
Forged Handles, Steel Blades, 20¢10¢
Malleable Handles, Laid with Steel..... 40¢
Forged Handles, Steel Blades, Berlin..... 40¢10¢
Jennings & Griffin Mfg. Co's, 7 to 10 inch..... 50¢
Niagara Snips..... 40¢
Seymour's..... 40¢40¢5¢
Pruning Shears and Tools—
Cronk's Pruning Shears..... 33¢
Dialton's Combined Pruning Hook and Saw, 1/2 doz. \$18.00..... 25¢25¢10¢
Dialton's Pruning Hook, 1/2 doz. \$12.00..... 25¢25¢10¢
John T. Henry Mfg. Company:
Pruning Shears all grades..... 50¢5¢
Orange Shears..... 50¢5¢
Grape..... 50¢10¢
Tree Pruners..... 50¢
Nagle's Pruning Shears..... 1/2 doz. \$8.00
P. S. & W. Co..... 30¢25¢10¢
Seymour's..... 60¢10¢10¢70¢5¢
Sheaves—Sliding Door—
Stowell's Anti-Friction..... 50¢
Patent Roller..... 60¢10¢60¢10¢5¢
Patent Roller Hatfield's, Sargent's list..... 80¢10¢10¢10¢75¢
Reading..... 70¢10¢75¢
R. & E..... 45¢10¢
Wrightsville, Hatfield Pattern..... 80¢
Sliding Shutter—
Reading list..... 70¢10¢75¢
R. & E..... 60¢60¢10¢
Sargent's list..... 50¢10¢
Shells—
Shells, Empty—
Best quality, all gauges..... 60¢5¢
Climax, Club, Rival, 10 and 12 gauge..... 65¢5¢
Pauer Shells, Empty:
Acme, Ideal, Leader, New Rapid, Smokeless 10, 12, 16 and 20 gauge..... 35¢10¢
Blue Rival, New Climax, Primrose Club, Yellow Rival, 10, 12, 16 and 20 gauge..... 15¢
Climax Club, League, Rival, 14, 16 and 20 gauge (7.50 lb)..... 20¢5¢
Climax Club, League, Rival, 10 and 12 gauge..... 25¢5¢
Defiance, High Base, New Victor, Nitro, Repeater, 10, 12, 16 and 20 gauge..... 15¢
Trap and Metal Lined, 10, 12, 16 and 20 gauge..... 35¢10¢5¢
Shells, Loaded—
Loaded with Black Powder..... 40¢5¢
Loaded with Nitro Powder..... 40¢10¢10¢5¢
Shoes, Horse, Mule, &c.—
Factory Shipments:
Horse and Mule, per keg..... \$3.00@3.50
Burlen's, all sizes..... \$3.60
Bryden, Phoenix, Perkins, &c. \$3.75. 5¢
Diamond State, Crescent &c. \$3.75. 10¢
Schoenberger..... \$3.25
NOTE—There is a good deal of unevenness in current prices, whether from manufacturers or jobbers.
Shot—
Drop, up to B, 25-lb. bag..... \$1.50@1.40
Drop, up to B, 5-lb. bag..... 35¢
Buck, 25-lb. bag..... \$1.55@1.65
Buck, 5-lb. bag..... 15¢
Chilled, 25-lb. bag..... \$1.60@1.68
Dust Shot, 25-lb. bag..... \$2.00@2.10
Dust Shot, 5-lb. bag..... 50¢
Shovels and Spades—
No. 2, Polished, Sq. or Rd. Point, D or L Handle:
A1..... B3
Plain Back..... \$1.00 \$0.90
Strap Back..... 5.00 9.00
Cleveland Pat'n..... 10.30 9.30
Cs..... D4
Plain Back..... \$3.70 \$3.10
Strap Back..... 8.10 7.50
Cleveland Pat'n..... 8.50 7.90
All other sizes add 30¢ doz.
Black deduct 50¢ doz.
NOTE.—The above are the regular Association prices to small retailers, but are after, shared by jobbers \$0.50@1.00

Shovels and Tongs—

Brass Head 60¢50¢ to 60¢10¢
 Iron Head 60¢50¢ to 60¢10¢

Sieves and Sifters—

Hunter's Imitation, gro. \$11.00 to \$12.00
 Buffalo Metallic Blue, S. S. & Co., # gr.:
 14x10 18¢20
 812.90 \$13.80 \$15.00
 Pelipse # gr. \$10.00
 Electric Light # gr. \$12.00
 Hunter's Genuine # gr. \$12.50
 Shaker (Barber's Pat.) Flour Sifters,
 # doz., \$2.00 30¢

Sieves, Tin R m—

Per dozen
 Inch 14 16 18 20
 Black full size \$0.95 38 1.00 1.10
 Plated, full size \$1.05 1.05 1.10 1.20
 Black, scant \$0.75 .80 .85

Sieves, Wooden Rim—

Nested, 10, 11 and 12 Inch
 Mesh 18, Nested, doz. \$1.75 to \$2.00
 Mesh 20, Nested, doz. 85¢ to 90¢
 Mesh 24, Nested, doz. 1.00 to 1.05

Sinks—**Cast Iron—**

Standard list 60¢ to 60¢10¢
 Note.—There is not entire uniformity
 in lists used by jobbers.

Wrought Steel—

Columbus Galv'd and Enamelled 60¢ to 75¢
 Columbus, Painted 45¢
 L. & G. Mfg. Co., Galvanized 50¢
 L. & G. Mfg. Co., Enamelled 50¢

Skins, Wagon—

Cast Iron 70¢ to 10¢75¢
 Malleable Iron 40¢ to 10¢50¢
 Steel 40¢ to 40¢10¢

Slates—

"D" Slates 50¢ to 10¢50¢ to 10¢10¢
 Unexcelled Noiseless Slates 60¢ to 10¢50¢ to 10¢50¢
 Wire Bound 40¢ to 10¢50¢
 Double Slates, add \$1 case, net.

Slaw Cutters—See Cutters.**Slicers, Vegetable—**

Sterling \$2.00 33¢ to 45¢

Snaps, Harness—

German 40¢ to 40¢10¢

Covert Mfg. Co.:—

Beroy 35¢ to 45¢
 High Grade 45¢ to 45¢
 Jockey 45¢ to 45¢
 Trojan 45¢ to 45¢

Covert's Saddlery Works:—

Banner 60¢ to 10¢
 Crown 60¢ to 10¢
 Triumph 60¢ to 10¢

W. & E. T. Fitch Co.:—

Bristol 40¢ to 10¢
 Empire 50¢ to 50¢
 German 40¢ to 10¢
 National 50¢ to 50¢
 Perfect 50¢ to 50¢
 Clipper 40¢ to 10¢
 Champion 40¢ to 10¢
 Security 40¢ to 10¢
 Victor 60¢ to 50¢
 Oneida Community 65¢ to 10¢
 Solid Steel 65¢ to 10¢
 Sargent's Patent Guarded 60¢ to 10¢

Snaths—

Scythe 45¢ to 55¢

Snips, Tanners—See Shears.**Soldering Irons—**

See Irons, Soldering.

Spoke Trimmers—

See Trimmers, Spoke.

Spoons and Forks—

Silver Plated—

Flat Ware 50¢ to 10¢ to 60¢ to 10¢
 Wm. Rogers Mfg. Co. 50¢ to 10¢

Miscellaneous—

German Silver 60¢ to 10¢
 Wm. Rogers Mfg. Co.:
 18¢ German Silver 60¢
 Rogers' Silver Metal 50¢ to 10¢

Springs—

Door—

Gem (Coll.) 20¢
 Star (Coll.) 30¢
 Torrey's Rod, 39 in. # doz. \$1.10 to \$1.25
 Warner's No. 2, # doz. \$2.50; No. 3,
 \$3.00 60¢ to 10¢
 Victor (Coll.) 50¢ to 10¢ to 10¢

Carriage, Wagon, &c.

Factory Shipments.
 1 1/4 in. and wider Blk. Hf. Brt. Brt.
 4 1/4 4 1/2 4 3/4 4 1/2
 Cliff's Bolster Springs 35¢
 Cliff's Seat Springs # pair 55¢

Sprinklers, Lawn—

Enterprise 25¢ to 30¢
 Philadelphia No. 1, # doz. \$12; No. 2,
 \$15; No. 3, \$24 30¢

Squares—

Nickel plated. List Jan. 5, 1900
 Steel and Iron 70¢ to 70¢
 Rosewood idl. Try Square and T-
 Bevels 60¢ to 10¢ to 10¢ to 10¢
 Iron Hdl. Try Squares and T-Bevels,
 40¢ to 10¢ to 40¢ to 10¢ to 10¢
 Diston's Try Sq. and T-Bev. Id. 60¢ to 10¢
 Winterbottom's Try and Miter 50¢ to 10¢

Squeezers—

Lemon—

Wood, Common, gro., No. a, \$5.25
 \$5.50; No. 1, \$6.25 to \$6.50.
 Waco Porcelain lined:
 Cheup doz. \$2.00 to \$2.75

Good Grade doz. \$5.00 to \$5.50
 Tinned Iron doz. \$0.75 to \$1.25
 Iron, Porcelain Lined doz. \$2.90 to \$3.25
 Jennings' Star # doz. \$1.85 to \$1.90
 King # doz. \$2.00

Staples—

Barbed Blind lb. 8¢ to 8¢4
 Electricians' Association list, 7¢ to 10¢
 Fence Staples, same price as Barbed
 Wire. See Trade Report.
 Poultry Netting, Staples, per lb. 5¢.
 Grand Crossing Tack Co.'s list 80¢ to 10¢

Steels, Butchers—

Dick's 40¢
 Foster Bros. 30¢
 C. & A. Hoffmann's 40¢
 Nichols Bros 50¢

Steelyards—

Stocks and Dies—
 Blacksmiths' 40¢ to 10¢10¢
 Gardner Die Stocks No. 1 50¢
 Gardner Die Stocks, larger size 40¢
 Green River 25¢
 Lightning Screw Plate 25¢
 Little Giant 25¢
 Rees's New Screw Plates 25¢ to 30¢
 Curtis Reversible Ratchet Die Stock 25¢

Stone—**Scythe Stones—**

Chicago Wheel & Mfg. Co.:
 Gen. Corundum, 10 inch, \$10.80 per
 doz. 12 inch, \$12.00
 Cleveland Stone Co., list Nov. '92, 33¢ to 45¢
 Pike Mfg. Co., list '95-'96 33¢ to 45¢

Oil Stones, &c.

Chicago Wheel & Mfg. Co.:
 Corundum Oil, Double Grit 50¢
 Corundum Axe Stones, Slips, etc. 55¢
 Pike Mfg. Co.:
 Hindostan No. 1, # 8¢
 Sand Stone 5¢
 Turkey Oil Stone, Extra 33¢ to 45¢
 5 to 5 in. 33¢ to 45¢
 Turkey Slips \$1.50
 Lily White Washita 60¢
 Rosy Red Washita 60¢
 Washita Stone, Extra 50¢
 Washita Stone, No. 2 30¢
 Lily White Slips 90¢
 Rosy Red Slips 90¢
 Washita Slips, Extra 80¢
 Washita Slips, No. 1 70¢
 Arkansas Stone, No. 1, 3 to 5 in. \$2.50
 Arkansas Stone, No. 1, 5 to 6 in. \$3.50
 India Oil Stones 25¢
 Tanite Mills:
 Emery Oil, # doz. \$5.00 50¢ to 60¢

Stoners—**Cherry—**

Enterprise 25¢ to 30¢

Stops, Bench—

Millers Falls 15¢ to 10¢
 Morrill's, # doz., No. 1, \$10.00; No. 2,
 \$11.00, 40¢ to 20¢

Stops, Window—

Ives' Patent 25¢ to 35¢
 Wilcox, Steel, per doz., \$6.00 50¢

Stove Boards—

See Boards, Stove.

Stove Polish—See Polish, Stove.**Strainers, Pump—**

Diamond Joe Pump Strainers, per doz. 75¢

Straps, Box—

Cary's Universal, case lots 20¢ to 10¢
 Stretchers, Carpet—
 Cast Iron, Steel Points doz. 55¢ to 55¢
 Cast Steel, Polished doz. 32¢
 Socket doz. 17¢

Stuffers, Sausage—

Miles' Challenge, # doz. \$20.50 to \$25.50
 Enterprise Mfg. Co. 25¢ to 25¢75¢
 National Specialty Mfg. Co., list Jan.
 1, '97 30¢

Tacks Brads, &c.—

See Trade Report.
 List Jan. 15, '99.
 Carpet Tacks, American 90¢ to 10¢
 American Cut Tacks 90¢ to 10¢
 Swedes Iron Tacks 90¢ to 10¢
 Swedes Upholsterers' Tacks 90¢ to 10¢
 Gimp Tacks 90¢ to 10¢
 Lace Tacks 90¢ to 10¢
 Trimmers' Tacks 90¢ to 10¢
 Looking Glass Tacks 70¢ to 10¢
 Bill Posters' and Railroad Tack 90¢ to 10¢
 Hungarian Nails 80¢ to 10¢
 Common and Patent Brads, 70¢ to 10¢
 Trunk and Clout Nails 80¢ to 10¢
 NOTE.—The above prices are for
 straight weights. An extra 5% is given
 for Star Weights ** and an extra 10% for
 Standard Weights ***

Miscellaneous—

Double Point Tacks 90¢ to 7¢ tens
 Steel Wire Brads, R. & E. Mfg.
 Co.'s list 50¢ to 10¢ to 50¢
 See also Nails, Wire.

Tanks, Oil—

Emerald, S. S. & Co. 30-gal. \$3.20
 Emerald, S. S. & Co. 60-gal. \$4.00
 Queen City S. S. & Co., 0-gal. \$3.50
 Queen City S. S. & Co., 60-gal. \$4.25

Tapes, Measuring—

American Asses' Skin 40¢ to 10¢ to 50¢
 Patent Leather 25¢ to 30¢ to 55¢
 Steel 40¢ to 10¢ to 55¢

Chesterman's 55¢ to 25¢55¢
 Edly's Steel 40¢ to 40¢55¢
 Edly's Metallic 30¢ to 30¢35¢
 Keuffel & Esser Co., Steel and Metallic,
 Lower list, 1899 35¢
 Lufkin's Steel 33¢ to 35¢
 Lufkin's Metallic 30¢ to 30¢55¢

Thermometers—

Tin Case 80¢ to 30¢10¢

Ties, Bale—Steel.

Standard Wire 50¢ to 10¢55¢

Ties, Wall—

Cleveland Wire Spinning Co.:
 Galv. Steel 5-32 x 8 1/4 in. # 1000, \$10.00
 Galv. Steel 5-32 x 8 1/4 in. # 1000, \$11.00
 Galv. Steel 5-32 x 1 1/4 in. # 000 \$12.00
 Galv. Steel 5-32 x 1 1/4 in. # 1000 \$14.00

Tinners' Shears, &c.—

See Shears, Tinners', &c.

Tinware—

Stamped, Japanese and Piced, sold
 very generally at net prices.

Tire Benders, Upsetters, &c.—See Benders and Upsetters, Tire.**Tobacco Cutters—**

See Cutters, Tobacco.

Tools—**Coopers—**

L. & I. J. White 90¢ to 20¢55¢

Saw—

Atkins' new list 40¢
 Simonds' Improved 33¢ to 45¢
 Simonds' Crescent 25¢

Ship—

L. & I. J. White 25¢

Transom Lifters—

See Lifters, Transom.

Traps—Game—

Oneida Pattern 70¢ to 10¢75¢ to 10¢
 Newhouse 45¢ to 50¢
 Hawley & Norton 65¢ to 50¢
 Victor (Oneida Pattern) 75¢ to 75¢ to 10¢
 Star (Blake Pattern) 65¢ to 10¢ to 70¢55¢

Mouse and Rat—

Mouse, Wood, Choker, doz. holes 90¢ to 90¢
 Mouse, Round or Square Wire
 doz. \$0.85 to 1.00
 Diamond Joe Mouse Traps, per doz. 60¢
 Diamond Joe Rat Traps, per doz. \$1.00
 Marry French Rat and Mouse Traps
 (Genuine)
 No. 1, Rat, Each \$1.12 1/2; # doz. \$12.00
 No. 3, Rat, # doz. \$6.00; case of 50
 \$5.50 doz.
 No. 3 1/2, Rat, # doz. \$4.75; case of 72
 \$4.50 doz.
 No. 4, Mouse, # doz. \$3.50; case of 72
 \$2.25 doz.
 No. 5, Mouse, # doz. \$2.75; case of 72
 \$2.00 doz.
 Schuyler's Rat Killer, No. 1, # gr. \$30.00;
 No. 2, # gr. \$30.00; Mouse, No. 3,
 \$18.00 50¢

Fly—

Balloon, Globe or Acme
 doz. \$1.15 to 1.25; gro. \$12.00 to 14.00
 Harper, Champion or Faragon
 doz. \$1.25 to 1.40; gro. \$13.50 to 15.00

Trimmers, Spoke—

Bonney's Nos. 1 and 2 40¢
 Stearns 25¢

Trowels—

Diston Brick and Pointing 30¢
 Diston Plastering 25¢
 Diston "Standard Brand" and Ga-
 den Trowels 40¢
 Never-Break Steel Garden Trowels,
 gro. \$7.00
 Peace's Plastering 30¢
 Rose Brick and Plastering 25¢ to 55¢
 Woodrough & McFarlin, Plastering 25¢ to 10¢

Trucks, Warehouse, &c.—

B. & L. Block Co.'s list 40¢
 Daisy Stove Trucks, improved pattern
 # doz. \$21.00
 Model Stove Trucks # doz. \$18.50

Tubs, Wash—

No. 1 2 3
 Galvanized, per doz. \$5.00 5.50 6.00
 Galvanized Wash tubs (S. S. & Co.):
 No. 1 2 3 10 20 30
 Per doz \$5 25 6.00 6.75 6.50 7.25 8.00

Twine—

Miscellaneous—

Flax Twine—

No. 9, 14 and 1/4-lb. Balls, 22¢ 26¢
 No. 12, 14 and 1/4-lb. Balls, 19¢ 26¢
 No. 15, 14 and 1/4-lb. Balls, 16¢ 18¢
 No. 18, 14 and 1/4-lb. Balls, 19¢ 18¢
 No. 24, 14 and 1/4-lb. Balls, 15¢ 18¢
 Chalk Line, Cotton, 1/4-lb. Balls
 18¢ to 20¢
 Cotton Mops, 6, 9, 12 and 15 lb. to
 doz 7¢ to 8¢
 Cotton Wrapping, 5 Balls to lb
 9¢ to 16¢
 American 2-Ply Hemp, 1/4 and 1/2-lb.
 Balls 12¢ to 15¢
 American 3-Ply Hemp, 1-lb. Balls
 12¢ to 15¢
 India 2-Ply Hemp, 1/4 and 1/2-lb.
 Balls (Spring Twine) 10¢
 India 3-Ply Hemp, 1-lb. Balls 10¢

India 3-Ply Hemp, 1/4-lb. Balls 9¢
 2, 3, 4 and 5-Ply Jute, 1/2-lb. Balls
 8¢ to 9¢
 Mason Line, Linen, 1/4-lb. Balls 45¢
 No. 26 Mattress, 1/4 and 1/2-lb. Balls 35¢
 Wool 7¢

Vises—

Solid Box 40¢ to 50¢
 Bonney's Saw Vises 40¢ to 10¢

Parallel—

Atch Machine Co.:
 Simpson's Adjustable 40¢
 Standard 40¢
 Amateur 25¢
 Bonney's 40¢ to 10¢
 Fisher & Norris Double Screw 15¢ to 10¢
 Hollands':
 Machinists' 40¢
 Key-tone 70¢
 Lewis Tool Co 20¢ to 30¢
 Massey's Perfect 15¢ to 20¢
 Massey's Clincher 30¢ to 40¢
 Merrill's 30¢
 Miller's Falls low list 10¢
 Parker's:
 Victor 20¢ to 25¢
 Regulars 20¢ to 25¢
 Vulcan's 40¢ to 45¢
 Combination Pipe 55¢ to 60¢
 Prentiss 20¢ to 25¢
 Sargent's 40¢
 Simpson's Adjustable 40¢
 Sneliker's X. L. 20¢ to 25¢
 Stephens 20¢ to 25¢
 Toley's Woodworking 25¢
 Van, W. & W. Edw. Co. 40¢

Saw Filers—

Bonney's No. 1, \$13; No. 3, \$16, 50¢ to 10¢
 Diston's D 3 Clamp and Guide, # doz. \$30
 Reading 40¢ to 10¢
 Wentworth's Rubber Jaw, Nos. 1, 2
 and 3 30¢ to 75¢

Miscellaneous—

Signal & Keeler Combination Pipe
 Vise 60¢
 Parker's Combination Pipe:
 87 Series 60¢
 187 Series 60¢ to 55¢
 No. 870 40¢

Wads—Price Per M.

B. E., 11 up 60¢
 B. E., 9 and 10 70¢
 B. E., 8 80¢
 B. E., 7 80¢
 P. E., 11 up 1.00
 P. E., 9 and 10 1.25
 P. E., 8 1.50
 P. E., 7 1.50
 Ely's B. E., 11 and larger \$1.70 to \$1.75
 Ely's P. E., 12 to 20 \$3.00 to \$3.25

Wagon Jacks—

See Jacks, Wagon.

Ware, Hollow—

Aluminum—
 S. S. & Co. Reduced List 40¢

Cast Iron, Hollow—

Stove Hollow Ware:
 Ground 65¢ to 65¢10¢
 Unground 70¢ to 70¢10¢
 White Enamelled Ware:
 Maslin Kettles 80¢ to 80¢10¢
 Boilers and Saucepans 60¢ to 60¢5¢
 Tinned Boilers and Saucepans
 60¢ to 60¢5¢

See also Pots, Glue.

Enamelled—

Agate Nickel Steel Ware, list July '99, 35¢
 Granite Ware, list Jan. 1, '94, revised
 Jan. 2, '95 40¢ to 10¢
 Second quality, Agate Nickel Steel, 65¢
 Second quality, Granite
 70¢ to 10¢ to 70¢ to 10¢ to 10¢

Iron Clad:—

Perforated Ware, high list 70¢
 Mottled Ware, high list 70¢
 Never Break Enamelled 50¢ to 50¢10¢

Tea Kettles—

Galvanized Tea Kettles:
 Inch 6 7 8 9
 Each 1.50 60¢ 55¢ 65¢

Steel Hollow Ware.

CURRENT METAL PRICES.

OCTOBER 17, 1900.

The following quotations are for small lots. Wholesale prices, at which large lots only can be bought, are given elsewhere in our weekly market report.

IRON AND STEEL— Bar Iron from Store—

| | |
|--|------------|
| Common Iron: Duty, Round, 0.6# #; Square, 0.8# # | |
| 1 to 1 1/4 in. round and square | 1.85@1.75# |
| 1 1/4 to 4 in. x 1/4 to 1 in. | 1.85@1.75# |
| Refined Iron: | |
| 1 to 1 1/4 in. round and square | 1.75@1.85# |
| 1 1/4 to 4 in. x 1/4 to 1 in. | 1.90@2.00# |
| 1 1/4 to 4 in. x 1/4 to 1 in. | 1.90@2.00# |
| 1 1/4 to 4 in. x 1/4 to 1 in. | 2.10@2.20# |
| Rods—1/4 and 11-16 round and square | 2.10@2.20# |
| Angles: | |
| 3 in. x 1/4 in. and larger | 2.00# |
| 3 in. x 3/4 in. x 3-16 in. | 2.10# |
| 1 1/4 to 3 in. x 3/4 in. | 2.10# |
| 1 1/4 to 3 in. x 3-16 in. and thicker | 2.10# |
| 1 to 1 1/4 in. x 3-16 in. | 2.10# |
| 1 to 1 1/4 in. x 3-16 in. | 2.20# |
| 1 1/4 in. x 3-16 in. | 2.50# |
| 1 1/4 in. x 3-16 in. | 2.55# |
| 1 1/4 in. x 3-16 in. | 2.20# |
| 1 1/4 in. x 3-16 in. | 2.70# |
| Tees: | |
| 1 in. | 2.40# |
| 1 1/4 in. | 2.30# |
| 1 1/4 in. and larger | 2.20# |
| Beams: | |
| Channel, 3 in. and larger | 2.25# |
| Beams—1/4 to 6 x 3-16 to No. 8 | 2.10# |
| Burden's Best Iron, base price | 2.15# |
| Burden's "H. B. & S. Iron, base price | 2.25# |
| Price | 2.30# |
| Winter | 2.30# |
| Merway Bars | 2.40# |
| Merway Shapes | 2.45# |

Merchant Steel from Store—

| | |
|---|---------------|
| Seamless Machinery | 1.70 to 1.80# |
| Too Calk, Tire and Sleigh Shoe | 2.00@2.50# |
| Best Cast Steel, base price in small lots | 2.50# |
| Best Cast Steel Machinery, base price in small lots | 2.50# |

Soft Steel Sheets—

| | | | |
|----------|-------|--------|-------|
| 1/4 inch | 1.85# | No. 14 | 2.40# |
| 1/2 inch | 1.90# | No. 16 | 2.50# |
| 3/4 inch | 2.10# | No. 18 | 2.80# |
| No. 10 | 2.30# | No. 20 | 2.90# |
| No. 12 | 2.30# | No. 22 | 3.30# |

Sheet Iron from Store.

Black.

| | Common | R. G. Cleaned |
|---------------|----------|---------------|
| | American | American |
| No. 14 to 16 | 2.20# | 2.00# |
| No. 18 to 21 | 2.30# | 2.10# |
| No. 23 to 24 | 2.30# | 2.10# |
| No. 25 and 26 | 2.30# | 2.10# |
| No. 27 | 2.30# | 2.10# |
| No. 28 | 2.30# | 2.10# |

Russia, Planished, &c.

| | |
|--------------------------------------|-------|
| Genuine Russia, according to assort- | 2.10# |
| Patent Planished | 2.10# |
| Galvanized | 2.10# |

| | B. B. |
|---------------------|-------|
| | 12# |
| No. 10 to 16 | 2.10# |
| No. 17 to 21 | 2.10# |
| No. 23 to 24 | 2.10# |
| No. 25 to 26 | 2.10# |
| No. 27 | 2.10# |
| No. 28 | 2.10# |
| No. 29 | 2.10# |
| No. 30 | 2.10# |
| 36 in. 1/2 # higher | 2.10# |

Foreign Steel from Store—

| | |
|--|-----|
| Best Cast | 15# |
| Extra Cast | 18# |
| Swedish, Cast | 18# |
| Best Double Shear | 15# |
| Wister, 1st quality | 13# |
| German Steel, Best | 10# |
| 2d quality | 9# |
| 3d quality | 8# |
| Swedish Cast Steel, 1st quality | 15# |
| 2d quality | 14# |
| 3d quality | 13# |
| R. Muehler's "Special" | 19# |
| "Titanio" | 19# |
| Hobson's Choice XX Extra Best | 25# |
| Joseph Self Hardening | 45# |
| Seamans' "Nelson" Steel | 40# |
| Hobson's "Boho" Special Self-Hardening | 43# |

METALS—

Tin—

| | |
|---------------------------------|------------|
| Duty—Pigs, Bars and Block. Free | Per lb. |
| Banco, Pig | 31# |
| Banco, Pig | 30@30 1/2# |
| Banco in Bars | 31@31 1/2# |

Tin Plates—

American Charcoal Plates.

| | |
|--------------------------------|------------|
| Calland Grade: | |
| IX, 14 x 20 | 7.50 |
| IX, 14 x 20 | 9.00 |
| Melvin Grade: | |
| IX, 14 x 20 | 7.00 |
| IX, 14 x 20 | 8.50 |
| Allaway Grade: | |
| IX, 14 x 20 | 6.15 |
| IX, 14 x 20 | 7.35 |
| American Coke Plates—Bessemer— | |
| IX, 14 x 20 | 108# |
| IX, 14 x 20 | 6.25 |
| IX, 14 x 20 | 7.50 |
| American Terne Plates— | |
| IX, 20 x 28 | 10.50 |
| IX, 20 x 28 | 12.50 |
| Tin Boiler Plates, American— | |
| IX, 14 x 26 | 112 sheets |
| IX, 14 x 28 | 112 sheets |
| IX, 14 x 31 | 112 sheets |

Copper—

| | |
|---|----------------|
| Duty—Pig, Bar and Ingot and Old Copper free | |
| Manufactured, 2 1/2# # lb. | |
| Lake | 17 1/2@17 3/4# |
| Ansonia grade Casting | 17 1/2@17 3/4# |

Sheet and Bolt—

January 19, 1900.

Net.

Prices, in cents per pound.

Sheet 30 x 60.

| | Not wider than | Not longer than | And longer than | 64 oz. & over, 50 lb. sheet, 30 x 60 and heavier. | 30 oz. to 64 oz. 25 to 50 lb. | 24 oz. to 30 oz. 15½ to 25 lb. | 16 oz. to 24 oz. 12½ to 15½ lb. | 14 oz. and 15 oz. 11 to 12½ lb. | 12 oz. and 13 oz. 9½ to 11 lb. | 10 oz. and 11 oz. 7½ to 9½ lb. | 8 oz. and 9 oz. 6½ to 7½ lb. | Lighter than 8 oz. |
|------------|----------------|-----------------|-----------------|--|----------------------------------|-----------------------------------|------------------------------------|------------------------------------|-----------------------------------|-----------------------------------|---------------------------------|--------------------|
| 1 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| ¾ in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| ½ in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| ⅜ in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| ¼ in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| ⅓ in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| ⅔ in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 1 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 1 1/8 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 1 1/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 1 1/2 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 1 3/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 2 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 2 1/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 2 1/2 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 2 3/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 3 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 3 1/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 3 1/2 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 3 3/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 4 1/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 4 1/2 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 4 3/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 5 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 5 1/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 5 1/2 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 5 3/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 6 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 6 1/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 6 1/2 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 6 3/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 7 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 7 1/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 7 1/2 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 7 3/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 8 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 8 1/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 8 1/2 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 8 3/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 9 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 9 1/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 9 1/2 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 9 3/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 10 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 10 1/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 10 1/2 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 10 3/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 11 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 11 1/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 11 1/2 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 11 3/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 12 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 12 1/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 12 1/2 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 12 3/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 13 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 13 1/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 13 1/2 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 13 3/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 14 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 14 1/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 14 1/2 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 14 3/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 15 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 15 1/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 15 1/2 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 15 3/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 16 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 16 1/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 16 1/2 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 16 3/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 17 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 17 1/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 17 1/2 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 17 3/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 18 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 18 1/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 18 1/2 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 18 3/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 19 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 19 1/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 19 1/2 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 19 3/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 20 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 20 1/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 20 1/2 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 20 3/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 21 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 21 1/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 21 1/2 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 21 3/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 22 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 22 1/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 22 1/2 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 22 3/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 23 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 23 1/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 23 1/2 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 23 3/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 24 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 24 1/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 24 1/2 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 24 3/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 25 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 25 1/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 25 1/2 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 25 3/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 26 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 26 1/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 26 1/2 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 26 3/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 27 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 27 1/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 27 1/2 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 27 3/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 28 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 28 1/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 28 1/2 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 28 3/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 29 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 29 1/4 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 29 1/2 in. | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 29 3/4 in. | 73 | | | | | | | | | | | |



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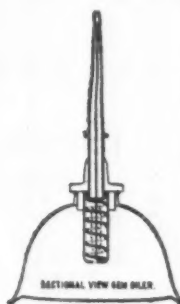
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A detailed technical illustration of a mechanical component, likely a valve or plug, shown in a perspective view. The component has a cylindrical body with a flared, conical section on the right. The left end is a circular face with a complex internal structure. A central vertical slot or channel runs through the middle of the component. On the front face, there is a diamond-shaped feature, possibly a valve seat or a decorative element. The illustration uses fine lines and shading to indicate the metallic texture and mechanical details.

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SAND PAPERS
IN
Reams and Rolls

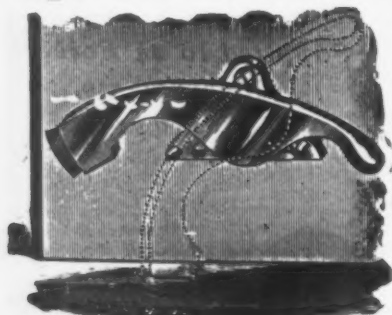
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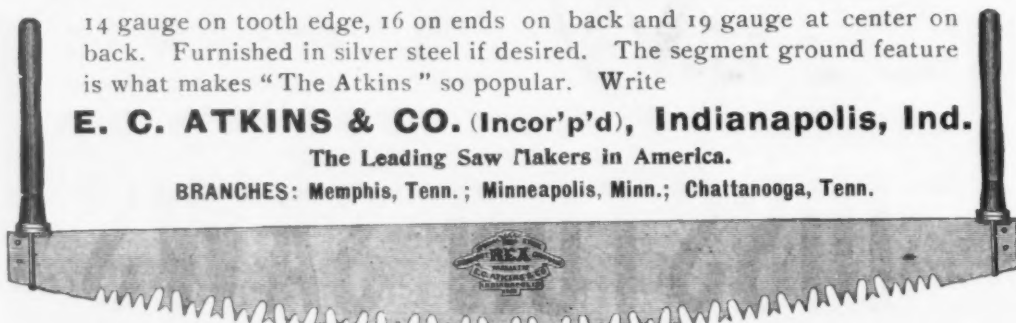
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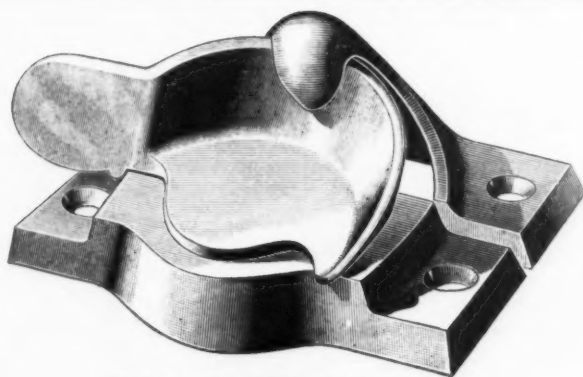
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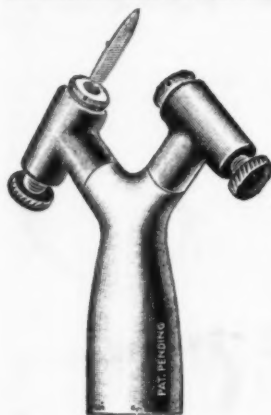
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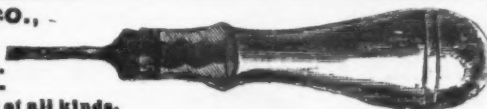
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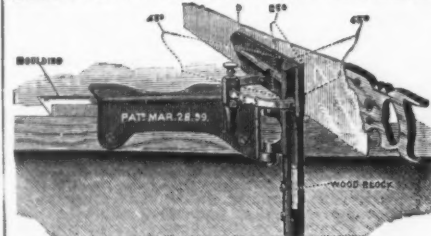
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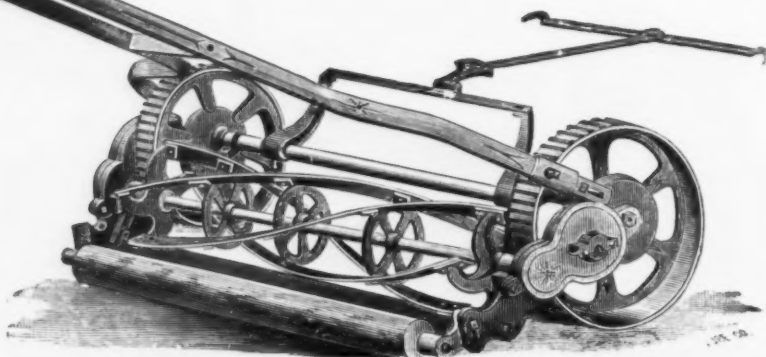
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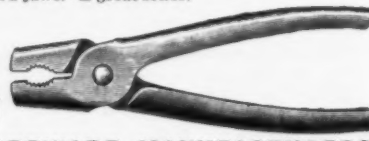
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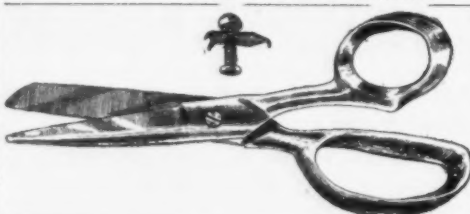
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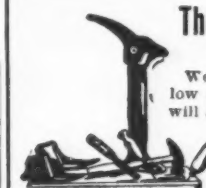
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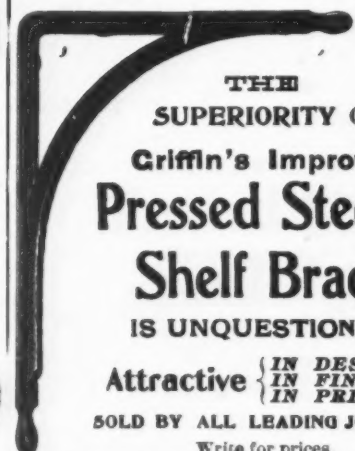
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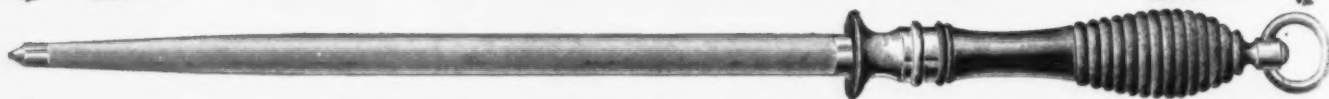
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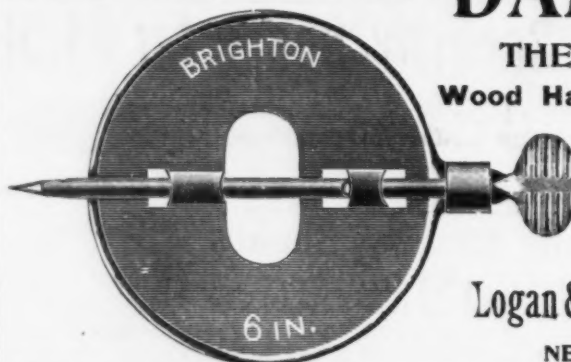
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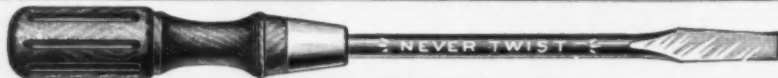
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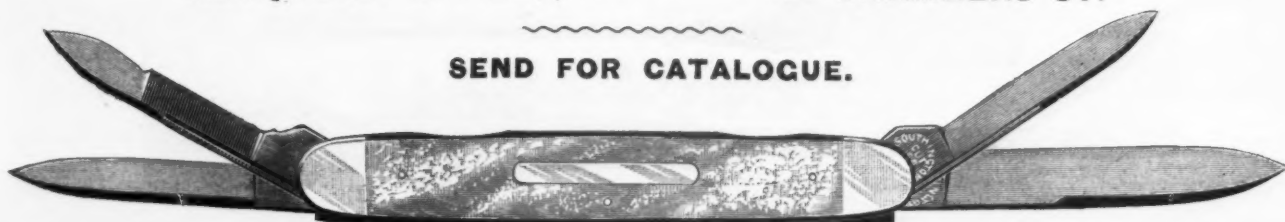


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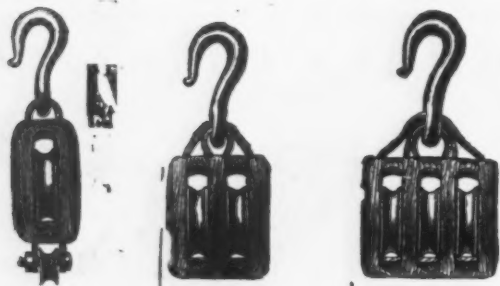
MANUFACTURERS OF

"UNION" and "EAGLE"

UNION BRAND—OVAL EDGE

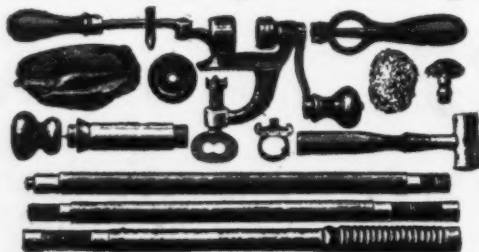
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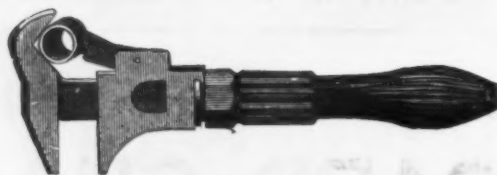
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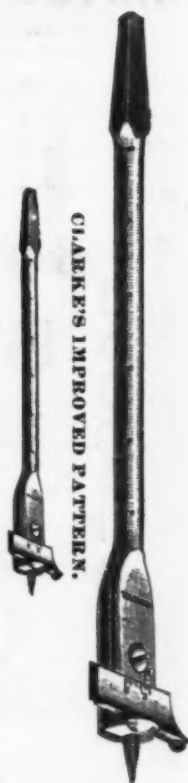
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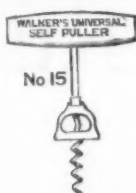
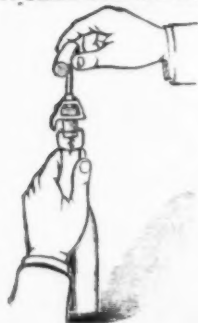
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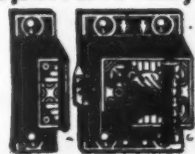
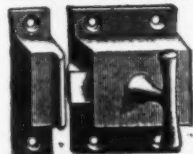


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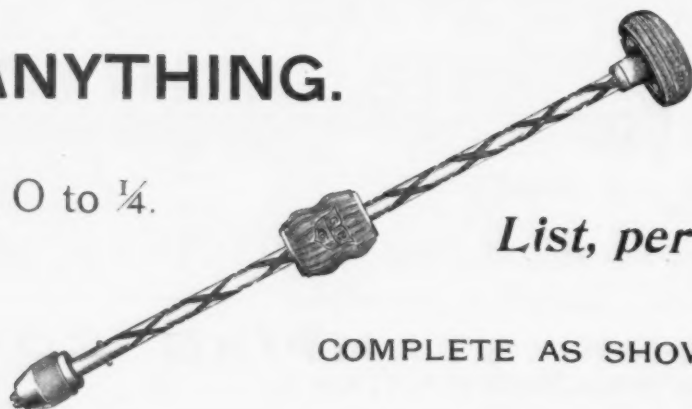
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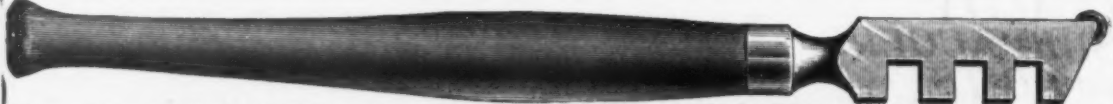
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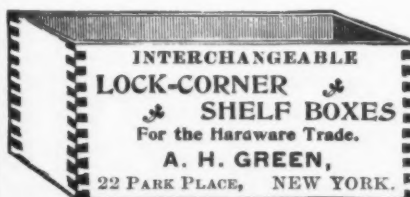
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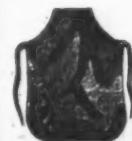
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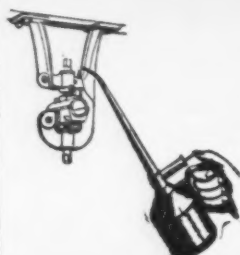
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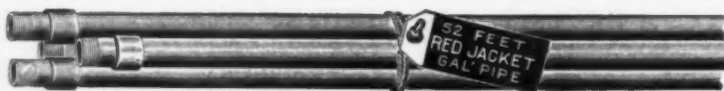
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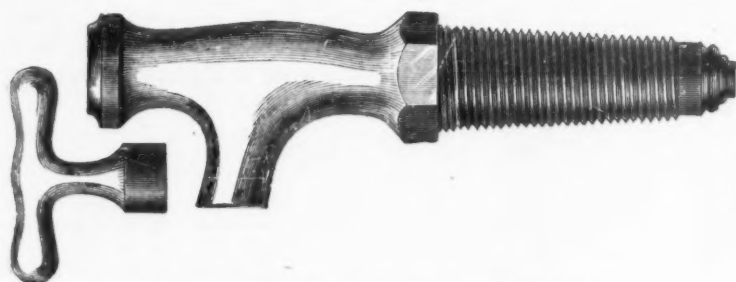
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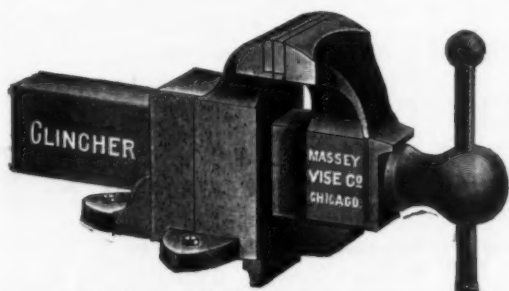
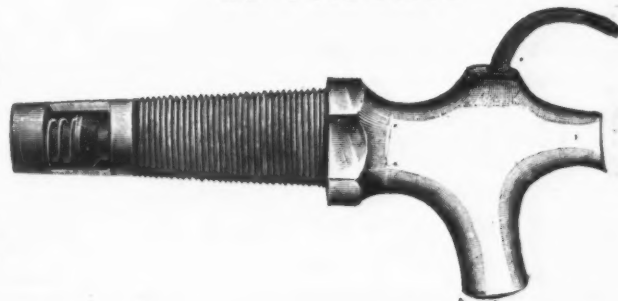
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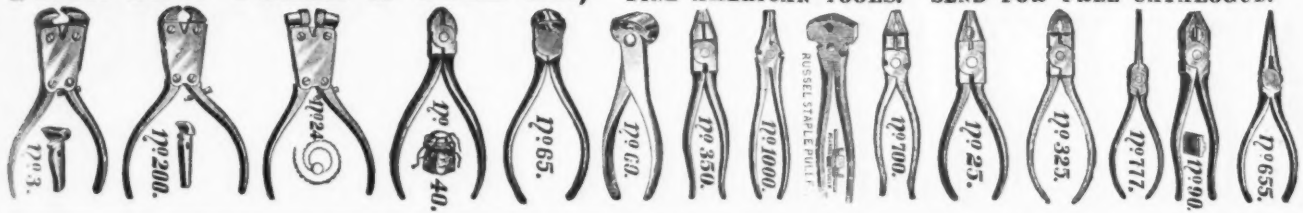
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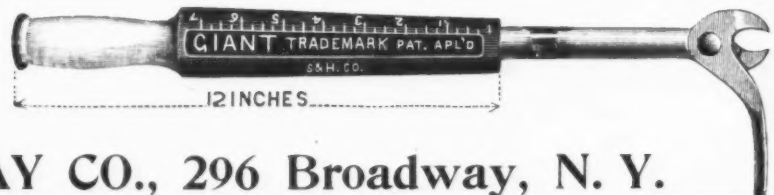
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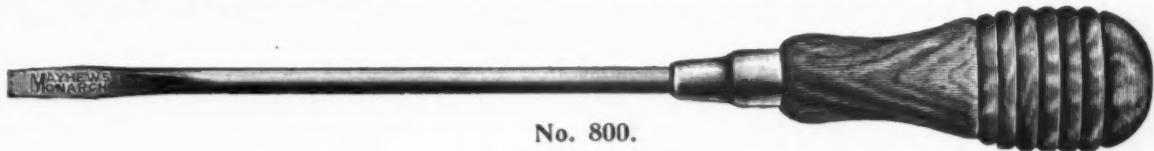
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Has a straight bar and extra long nut for
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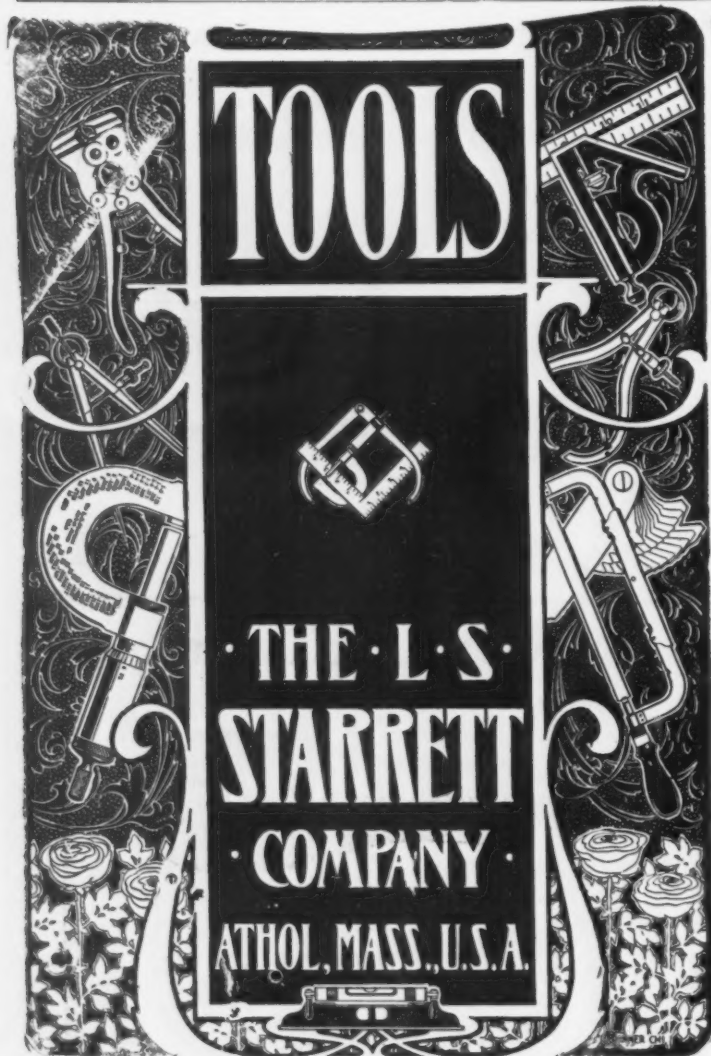
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NO. 16 A

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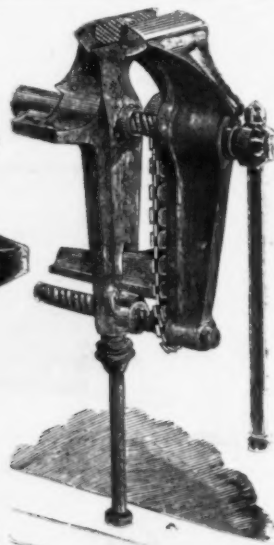
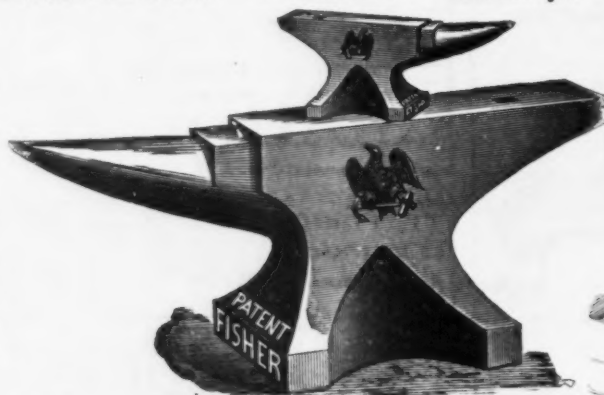
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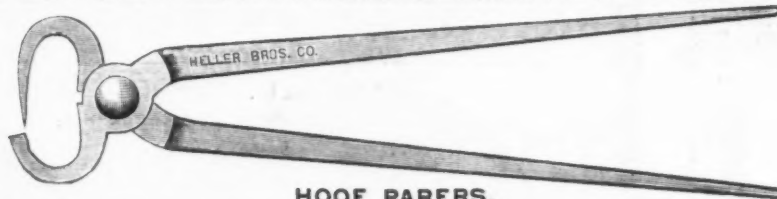
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Have been steadily **IMPROVED** in manufacture, kept constantly up to date and abreast with the **TIMES**. Their **SUPERIOR QUALITY** sets a known and tested **STANDARD OF EXCELLENCE**. Made from **OUR OWN PRODUCTION** of **SPECIAL REFINED CLAY CRUCIBLE CAST STEEL** and manufactured under machines of **OUR OWN PATENTED CONSTRUCTION** as well as **TEMPERED** by a **SECRET PROCESS**.

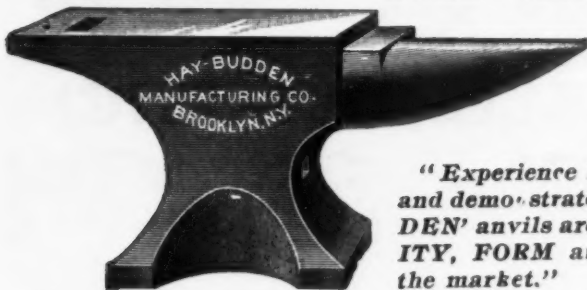


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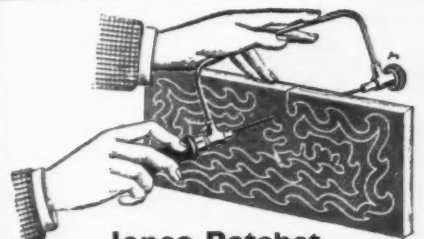
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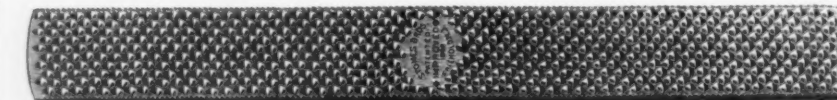
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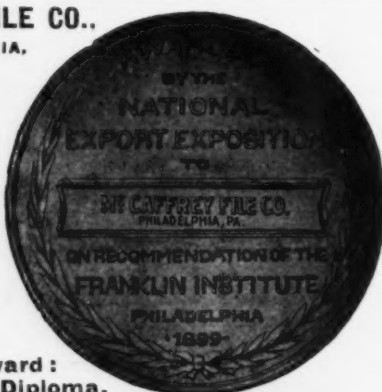
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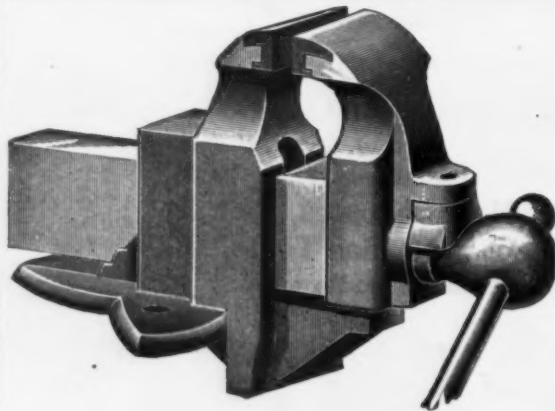
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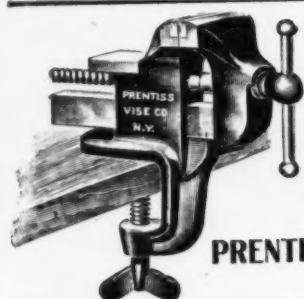


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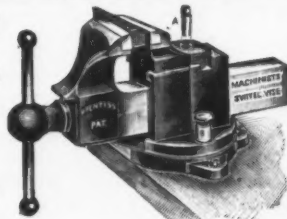
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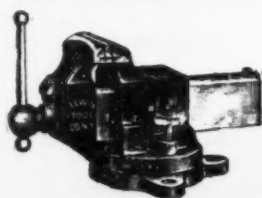
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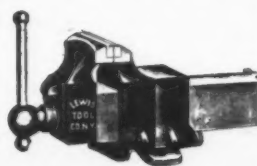
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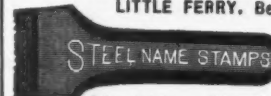
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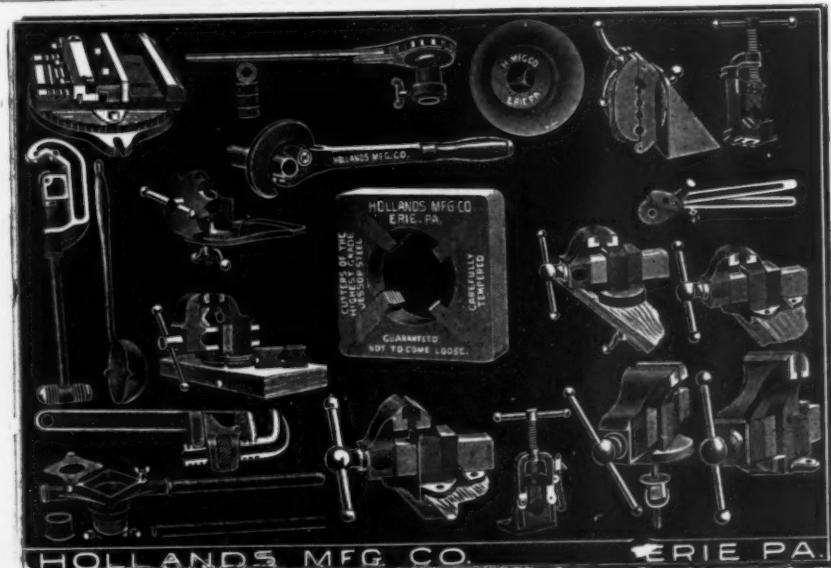
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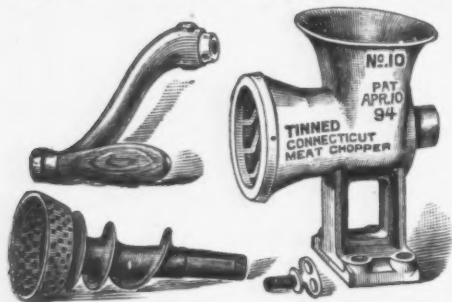
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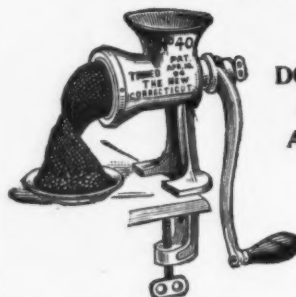
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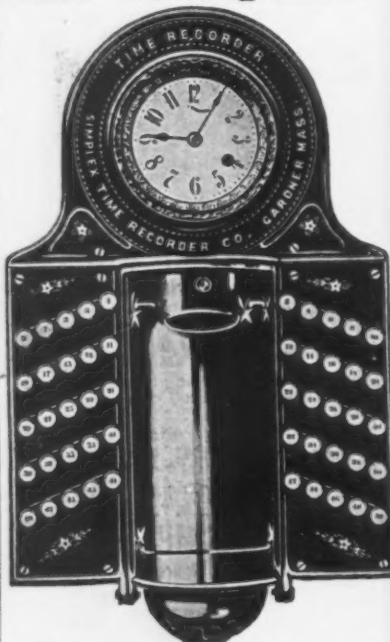
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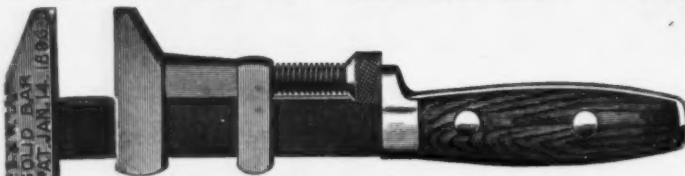
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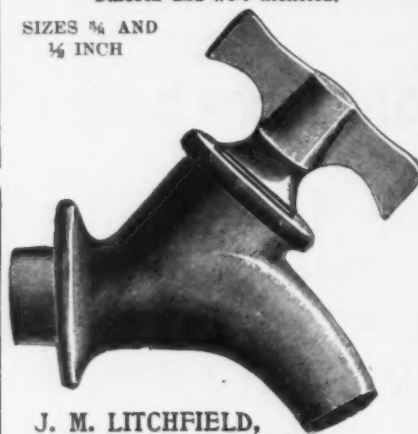
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All sets of "ENTERPRISE" Cold Handle Irons are equipped with
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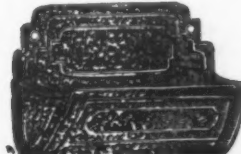
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Hardwaremen, are you abreast with the times?

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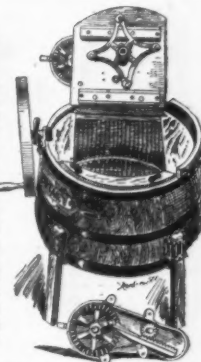


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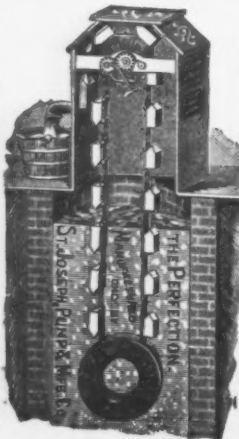
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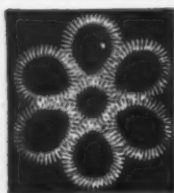
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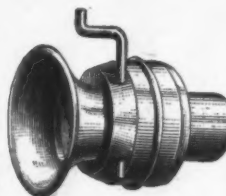
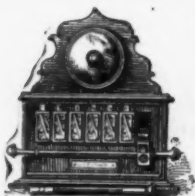
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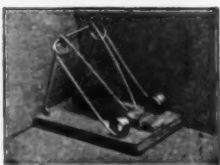


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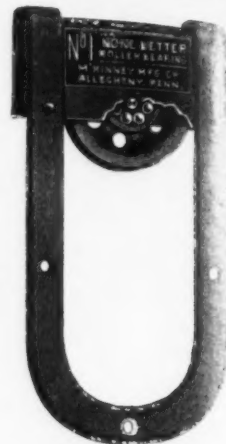
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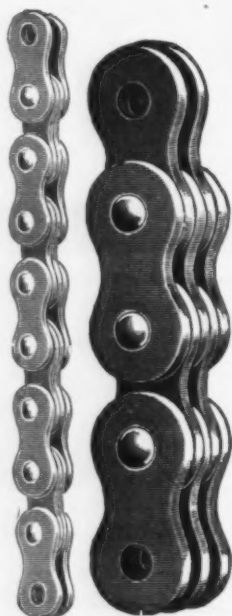
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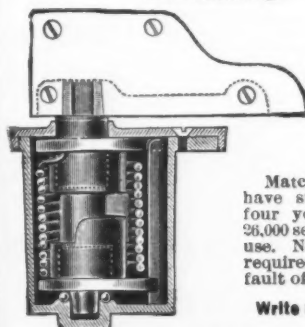
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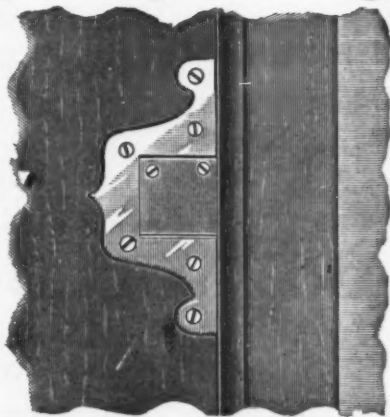
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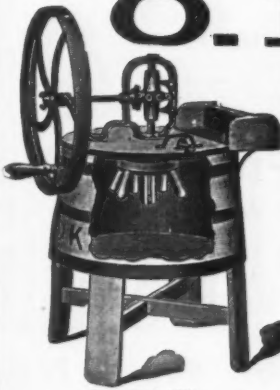
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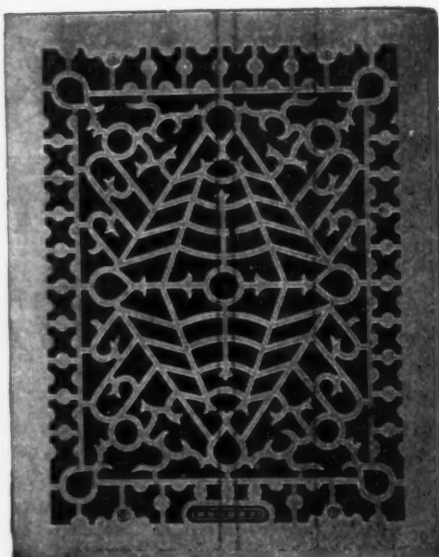
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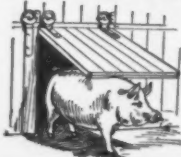


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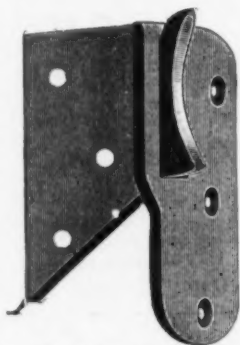
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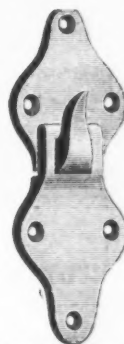
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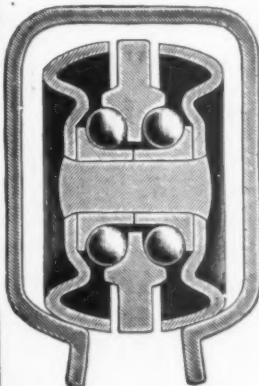
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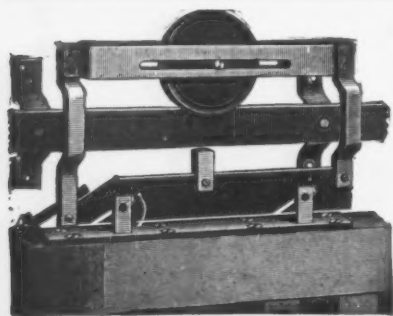
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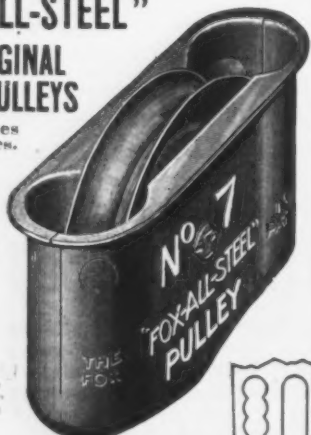
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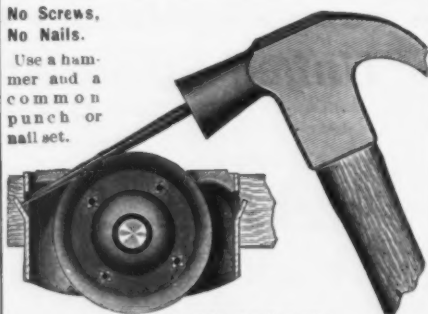
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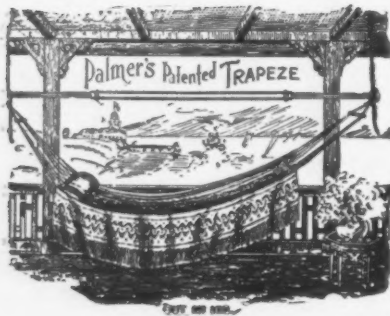
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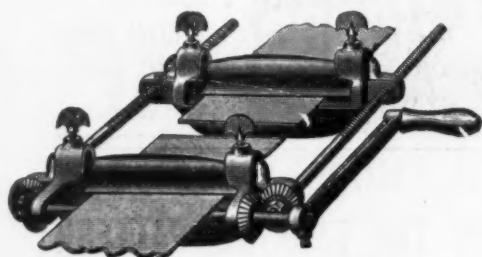
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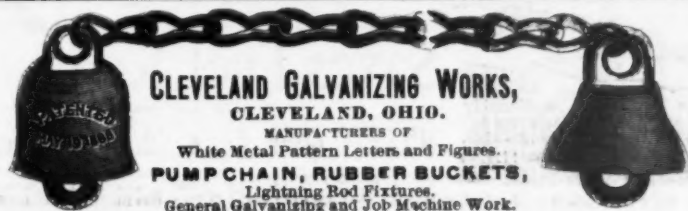


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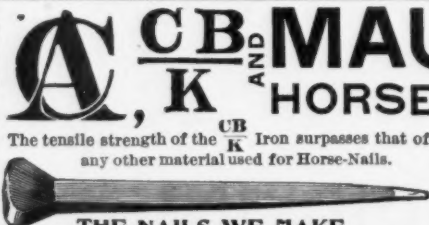
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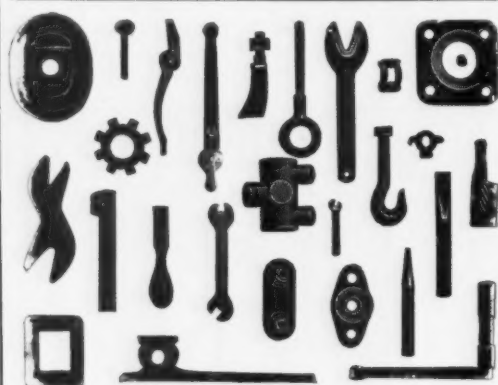
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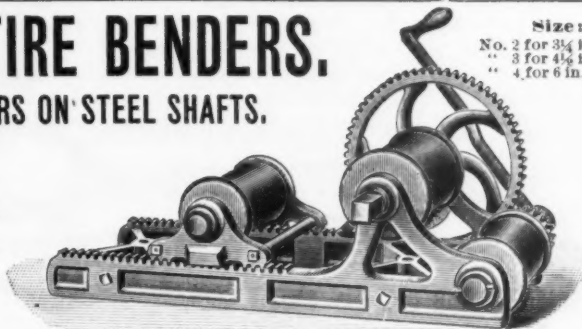
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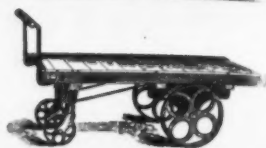
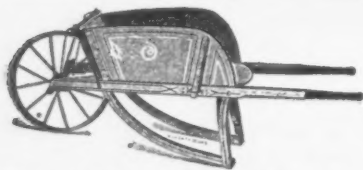
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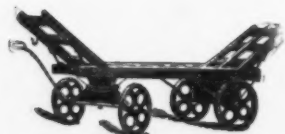
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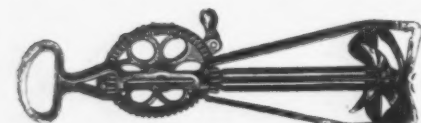


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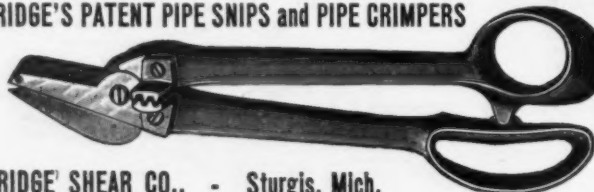


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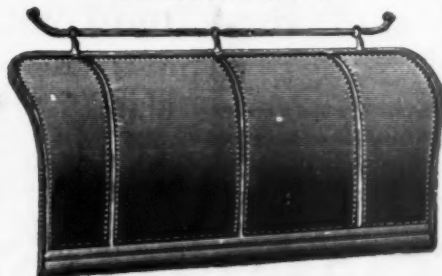
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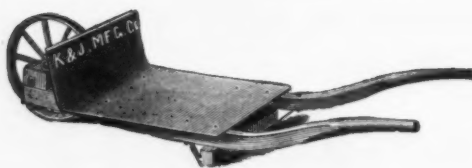
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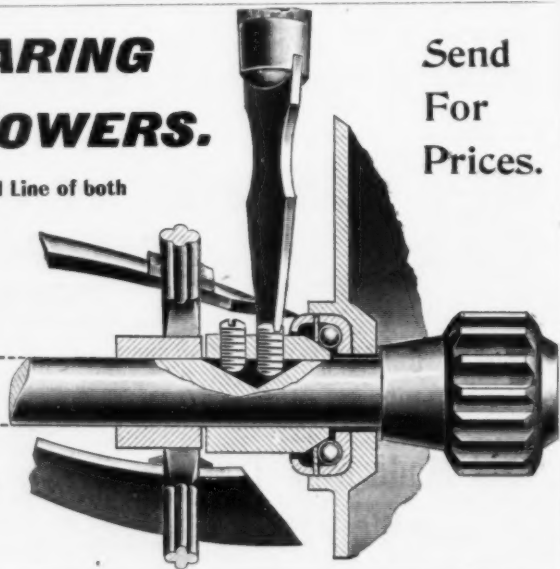


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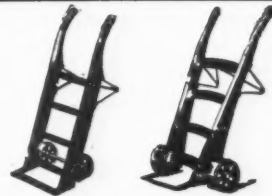


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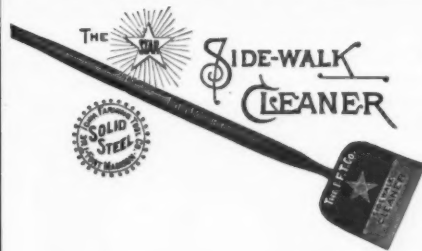
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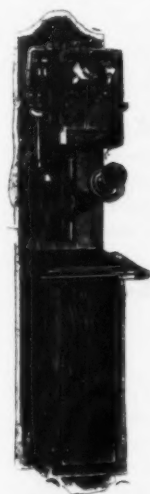
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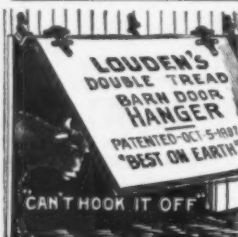
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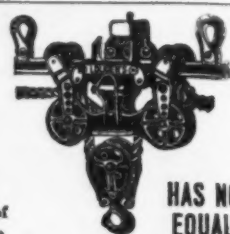
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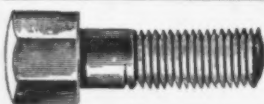


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Cary Mfg. Co., 19-21 Roosevelt St., N. Y.

Boxes, Hdw. Shelf, &c.

Green, A. H. & Co., 22 Park Place, N. Y.
Jones, Jesse, Paper Box Co., Phila., Pa.
Moore, C. P., Ravenswood, W. Va.

Brackets, Shelf

Atlas Mfg. Co., New Haven, Conn.
Griffin Mfg. Co., Allegheny, Pa.
Stowell Mfg. & Fdry Co., Chicago, Ill.

Brass and Copper

Ansonia Brass & Copper Co., 99 John St., N. Y.
Bridgeport Brass Co., Bridgeport, Ct.
Daval, John & Sons, 100 John, N. Y.
Hungerford, U. T., Brass & Copper Co., 121 Worth St., N. Y.
Plume & Atwood Mfg. Co., 29 Murray St., N. Y.
Randolph-Clowes Co., Waterbury, Conn.
Rutter, A. T., 236 Broadway, N. Y.
Seville Mfg. Co., Waterbury, Conn.
Shimer, H. M. & Co., Phila., Pa.
Waterbury Brass Co., 60 Centre St., N. Y.

Brass and Copper Rods

Hungerford, U. T., Brass & Copper Co., 121 Worth St., N. Y.

Brass and Copper Wire

Hungerford, U. T., Brass & Copper Co., 121 Worth St., N. Y.

Brass Butt Hinges

Hungerford, U. T., Brass & Copper Co., 121 Worth St., N. Y.
Tiebout, W. & J., 118 Chambers.

Brass Butts

Hungerford, U. T., Brass & Copper Co., 121 Worth St., N. Y.

Brass Foundries

Cram, Wm. & Sons S. & E. B. Co., Philadelphia, Pa.
Reeves, Paul S., Philadelphia, Pa.
Ryan, J. J. & Co., Chicago, Ill.

Brass Goods

Hungerford, U. T., Brass & Copper Co., 121 Worth St., N. Y.

Brass and Iron Jack Chains

Hungerford, U. T., Brass & Copper Co., 121 Worth St., N. Y.

Breast Drills

Miller Falls Co., 28 Warren St., N. Y.

Bridge Builders

American Bridge Co., East Berlin, Ct.
Boston Bridge Works, Boston, Mass.
Easter Bridge & Structural Co., Worcester, Mass.
Illinois Steel Co., Chicago, Ill.
New England Structural Co., Boston, Mass.
Seafie, Wm. B. & Sons, Pittsburgh.

Bronze Ingots

Syracuse Smelting Wks., Syracuse, N. Y.

Bronze, Manganese

Cram, Wm. & Sons S. & E. B. Co., Philadelphia, Pa.

Bronze, Tin

Ansonia Brass & Copper Co., 99 John St., N. Y.

Brooms and Brushes

Osborn Mfg. Co., Cleveland, O.

Buffing Wheels

Divine Bros. Co., Utica, N. Y.

Buggies

Parry Mfg. Co., Indianapolis, Ind.

Builders' Hardware

Norwalk Lock Co., So. Norwalk, Conn.
Reading Hardware Co., Reading, Pa.
Stanley Works, New Britain, Conn.
U. S. Steel Lock Co., Clinton, Iowa.

Buildings

Williams, White & Co., Moline, Ill.

Butchers' Saws

Boston, Henry & Sons, Inc., Phila., Pa.
Goodell-Pratt Co., Greenfield, Mass.
Jennings, C. E. & Co., 101 Reade St., N. Y.

Butchers' Tools

Chatillon, John & Sons, 85-89 Cliff St., N. Y.
Goodell Co., Antrim, N. H.
Hartzell, Emmert, Fairfield, Pa.

Butts and Hinges—See Hinges.**Calibers and Dividers**

Starrett, L. S. Co., Athol, Mass.
J. Stevens Arms & Tool Co., Chicopee Falls, Mass.

Cannon

Snow, L. T., New Haven, Conn.

Car Springs

Scott, Chas. Spring Co., Phila., Pa.

Carbide of Silicon

Carborundum Co., Niagara Falls, N. Y.

Carborundum Grains

Carborundum Co., Niagara Falls, N. Y.

Carborundum Wheels

Carborundum Co., Niagara Falls, N. Y.

Card Indexes

Globe Wernicke Co., Cincinnati, O.

Carriage Hardware

Atlas Bolt & Screw Co., Cleveland, O.
Baker, Jas. H. Mfg. Co., Pittsburgh, Pa.
Clapp, E. D. Mfg. Co., Auburn, N. Y.
Eccles, Richard, Auburn, N. Y.
McKinnon Dash Co., Buffalo, N. Y.
Scranton Forging Co., Scranton, Pa.

Carriage and Wagon Springs

Rowland, Wm. & Harvey, Phila., Pa.

Cars

Atlas Bolt & Screw Co., Cleveland, O.
Sheffield Car Co., Three Rivers, Mich.

Cartridges

Hungerford, U. T., Brass & Copper Co., 121 Worth St., N. Y.
Peters Cartridge Co., Cincinnati, O.
Union Metallic Cartridge Co., 313-315 Broadway, N. Y.

Carving Tools

- Jenkins Iron & Tool Co., Howard, Pa.
Link-Belt Engineering Co., Phila., Pa.
McKay Jas. & Co., Pittsburgh, Pa.
Nicholson & Co., Pittsburgh, Pa.
Onelda Community, Ltd., Niagara Falls
Standard Chain Co., Pittsburgh, Pa.
- China Plants**
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.
- Chemicals**
Fum & Amend, New York.
- Cherry Stoppers**
Enterprise Mfg. Co., Philadelphia, Pa.
Goodell Co., Antrim, N. H.
- Chisels**
Lack Bros., Millbury, Mass.
Buck, Chas., Millbury, Mass.
Jennings, C. E. Co., 101 Reade St., N. Y.
White, L. & I. J. Co., Buffalo, N. Y.
- Christmas Tree Holders**
North Bros. Mfg. Co., Philadelphia, Pa.
- Chucks**
Cushman Chuck Co., Hartford, Conn.
Doehner Mfg. Co., Middletown, Conn.
Goodell Pratt Co., Greenfield, Mass.
Hogson & Pettis Mfg. Co., New Haven.
Holland Mfg. Co., Erie, Pa.
Horton, E. & Son Co., Windsor Locks, Ct.
Ideal Machine Works, Hartford, Conn.
Pratt Chuck Co., Frankfort, N. Y.
Skinner Chuck Co., New Britain, Conn.
Standard Tool Co., Cleveland, O.
Union Mfg. Co., 108 Chambers, N. Y.
Whitson, D. E. Mach. Co., New London, N. Y.
- Cider Mills**
H. H. Hunt, R. W. & Co., Norfolk, Va.
- Circular Sawing Machines**
Kladder, R. E., Worcester, Mass.
- Clamps**
Bentley, C. H. & Co., Chicago, Ill.
H. H. Thos., Brooklyn, N. Y.
Hammer & Co., Branford, Conn.
- Clipping Machines**
Amer. Shearer Mfg. Co., Nashua, N. H.
Chicago Flexible Shaft Co., Chicago, Ill.
McCoy, Jos. F. Co., 26 Warren St., N. Y.
Wiebusch & Hilger, Ltd., 9-15 Murray St., N. Y.
- Clothes Dryers**
Hill Dryer Co., Worcester, Mass.
- Clothes Line Hook**
Wilson, E. H. & Co., Allston, Mass.
- Clothes Pins**
U. S. Clothes Pin Co., Montpelier, Vt.
- Coal**
Alabama Consolidated Coal & Iron Co., Birmingham, Ala.
Sloss Sheffield Steel & Iron Co., Birmingham, Ala.
Washington Coal & Coke Co., Dawson, Pa.
Wister, Francis, Philadelphia, Pa.
- Coal Cars**
Lansing Wheelbarrow Co., Lansing, Mich.
- Coal Picks**
Jenkins Iron & Tool Co., Howard, Pa.
- Coal Shutes**
Lansing Wheelbarrow Co., Lansing, Mich.
- Coffee and Spice Mills**
Arcade Mfg. Co., Freeport, Ill.
Parker, Chas. Co., Meriden, Conn.
- Coke**
Alabama Consolidated Coal & Iron Co., Birmingham, Ala.
Bessemer Coke Co., Pittsburgh, Pa.
Cherry Valley Iron Co., Pittsburgh, Pa.
Dimmick, J. K. & Co., Phila., Pa.
Frick, H. C. Coke Co., Pittsburgh, Pa.
Houston, C. B. & Co., Philadelphia, Pa.
Sloss Sheffield Steel & Iron Co., Birmingham, Ala.
Tennessee Coal, Iron & R. R. Co., Birmingham, Ala.
Virginia Iron, Coal & Coke Co., Bristol, Va., Tenn.
Washington Coal & Coke Co., Dawson, Pa.
Wister, Francis, Philadelphia, Pa.
- Compressed Air Machinery**
Phila. Pneumatic Tool Co., Phila., Pa.
- Conductor Pipe**
Berger Bros. Co., Philadelphia, Pa.
- Conveying Machinery**
Aultman Co., Canton, Ohio.
Brown Hoisting Machinery Co., Cleveland, Ohio.
California Wire Works, San Francisco, Du Bois Iron Works, Du Bois, Pa.
Hunt, C. W. Co., W. New Brighton, N. Y.
Jeffrey Mfg. Co., Columbus, O.
Link-Belt Engineering Co., Phila., Pa.
- Cooking Utensils**
Cleveland Stamping & Tool Co., Cleveland, O.
- Coping Saw**
Jones & Dommersnas, Chicago, Ill.
- Copper**
Hendricks Bros., 49 Cliff, N. Y.
Hungerford, U. T., Brass & Copper Co., 121 Worth St., N. Y.
United Metals Selling Co., 11 Broadway, N. Y.
- Copper Hammers**
Hungerford, U. T., Brass & Copper Co., 121 Worth St., N. Y.
- Copper Rivets and Burrs**
Hungerford, U. T., Brass & Copper Co., 121 Worth St., N. Y.
- Copper Tacks and Nails**
Hungerford, U. T., Brass & Copper Co., 121 Worth St., N. Y.
- Cordage**
Macomber & White Rose Co., Chicago
Sanson Cordage Works, Boston, Mass.
Silver Lake Co., Boston, Mass.
- Core Ovens**
Miller Core Oven Co., Brighton, Mass.
- Cork Screws and Cork Pullers**
Erie Specialty Co., Erie, Pa.
- Corn Hooks**
Washington & Cooley Mfg. Co., Jackson, Mich.
- Corn Huskers**
Wheeler Mfg. Co., Aurora, Ill.
- Corrugated Iron and Steel**
Garry Iron & Steel Roofing Co., Cleveland, O.
McCallough Iron Co., Wilmington, Del.
Scaife, Wm. B. & Sons, Pittsburgh.
- Cotter Pin Machines, Automatic**
Shuster, F. B. Co., New Haven, Conn.
- Cotton Ties**
American Steel Hoop Co., Battery Park Building, N. Y.
- Counting Machines**
Durant, W. N., Milwaukee, Wis.
Hart, R. A., Battle Creek, Mich.
- Couplings, Compression**
Sennett, Geo. B. Co., Youngstown, O.
- Cow Ties**
Onelda Community, Ltd., Niagara Falls, N. Y.
- Cranes**
Brown Hoisting Machinery Co., Cleveland, Ohio.
Chisholm & Moore Mfg. Co., Cleveland, Cleveland Crane & Car Co., Cleveland, O.
Niles Tool Works Co., 136-138 Liberty St., N. Y.
Northern Engineering Works, Detroit, Mich.
Pawling & Harnischfeger, Milwaukee, Wis.
Pneumatic Crane Co., Pittsburgh, Pa.
Reading Crane & Hoist Wks., Reading, Pa.
Ridgway, Craig & Son Co., Coatesville, Pa.
Spindel, J. G., Reading, Pa.
- Crayon**
Steward, D. M. Mfg. Co., Chattanooga, Tenn.
- Crucibles**
Dixon, Jos. Crucible Co., Jersey City, N. J.
- Cupolas**
Northern Engineering Works, Detroit.
Paxson, J. W. Co., Philadelphia, Pa.
- Cupolas, Hot Blast**
Byram & Co., Detroit, Mich.
- Curry Combs**
New York Stamping Co., Brooklyn, N. Y.
- Cutlery**
Cattaraugus Cutlery Co., Little Valley, N. Y.
Chaffin, John & Sons, 85 to 87 Cliff St., N. Y.
Dame, Stoddard & Co., Boston.
Goodell Co., Antrim, N. H.
Hartzell, Emmert, Fairfield, Pa.
Kimball, C. J. Co., Bennington, N. H.
Smith & Hemenway Co., 236 Broadway, N. Y.
Southington Cutlery Co., Southington, Conn.
Wiebusch & Hilger, Ltd., 9 to 15 Murray St., N. Y.
- Cutting Off Machines**
Hurlbut Rogers Mach. Co., So. Sudbury, Mass.
- Dampers**
Logan & Strobbridge Iron Co., New Brighton, Pa.
Stover Mfg. Co., Freeport, Ill.
Williams, A. C., Ravenna, O.
- Dashes and Fenders**
McKinnon Dash Co., Buffalo, N. Y.
- Dehorners**
Brown, H. H. Mfg. Co., Decatur, Ill.
- Diamond Tools**
Dickinson, Thos. L., 45 Vesey St., N. Y.
- Dies**
Adlance Mach. Works, Brooklyn, N. Y.
Bliss, E. W. Co., Brooklyn, N. Y.
Ferracute Mach. Co., Bridgeton, N. J.
Hay-Budden Mfg. Co., Brooklyn, N. Y.
Mossberg, Frank Co., Attleboro, Mass.
Richard Mfg. Co., Bloomington, Mass.
Wilson & Smith, Worcester, Mass.
- Dog Collars**
Union Hardware Co., Torrington, Ct.
- Door Bells.—See Bells and Gongs.**
- Door Checks and Springs**
Bardsley, Jos., 147 151 Baxter St., N. Y.
Jaime Mfg. Co., Latrobe, Pa.
Ogden Mfg. Co., Newark, N. J.
Fullman Sash Balance Co., Rochester, N. Y.
- Door Holders**
Caldwell Mfg. Co., Rochester, N. Y.
- Draught Springs**
Burditt & Williams, Boston, Mass.
- Draw Benches**
Richard Mfg. Co., Bloomington, Pa.
Thompson, Hugh L., Waterbury, Ct.
- Drawing Stands**
Allen, D. H. & Co., Miamisburg, O.
- Drill Grinders**
Heald, L. S. & Son, Barre, Mass.
Sellers, Wm. & Co., Inc., Phila., Pa.
Washburn Shops of Worcester Polytechnic Inst., Worcester, Mass.
Wilmarth & Norman, Grand Rapids, Mich.
- Drilling Machines**
Baker Bros., Toledo, O.
Barnes, R. E. Co., Lockport, Ill.
Barnes, W. E. & John Co., Rockford, Ill.
Baush Mch. Tool Co., Springfield, Mass.
Bickford Drill & Tool Co., Cin., Ohio.
Bullard Machine Tool Co., Bridgeport, Ct.
Burnham, Geo. Co., Worcester, Mass.
Cincinnati Blower & Forge Co., Lancaster, Pa.
Cincinnati Mch. Tool Co., Cincinnati, O.
Dallett, Thos. H. & Co., Philadelphia.
D'Amond & Littlefield Mch. Co., 131 Worth St., N. Y.
Davis, W. P., Machine Co., Rochester, N. Y.
Detrick & Harvey Mch. Co., Baltimore, Md.
Fosdick & Holloway Mach. Tool Co., Cincinnati, O.
Harrington, E. Son & Co., Phila., Pa.
Hill, Clarke & Co., Boston, Mass.
Hooper Mfg. Co., Freeport, Ill.
Niles Tool Works Co., 136-138 Liberty St., N. Y.
Prentice Bros., Worcester, Mass.
Quint, A. D., Hartford, Conn.
Shuster, F. B. Co., New Haven, Conn.
Sibley & Ware, So. Bend, Ind.
Sigourney Tool Co., Hartford, Conn.
Silver Mfg. Co., Salem, O.
Slate Dwight Machine Co., Hartford, Ct.
Stow Flexible Shaft Co., Phila., Pa.
Wiley & Russell Mfg. Co., Greenfield, Mass.
Woodward & Rogers, Hartford, Conn.
York, S. M. Co., Cleveland, O.
- Drilling Machines, Automatic**
Gould & Eberhardt, Newark, N. J.
- Drive Chains**
Locke Steel Belt Co., Bridgeport, Conn.
- Drop Forgings**
Belden Machine Co., New Haven, Conn.
Billings & Spencer Co., Hartford, Conn.
Chicago Drop Forging & Fdry. Co., Kensington, Ill.
Clapp, E. D. Mfg. Co., Auburn, N. Y.
Consolidated Railway Electric Lighting & Equipment Co., 100 Broadway, N. Y.
Eccles, Richard, Auburn, N. Y.
General Forging Co., Broomton, N. J.
Indianapolis Drop Forging Co., Indianapolis, Ind.
Keystone Drop Forge Co., Philadelphia.
Kilburn & Bishop Co., New Haven, Conn.
R. I. Tool Co., Providence, R. I.
Seranton Forging Co., Seranton, Pa.
Seward, M. & Son Co., New Haven, Ct.
Springfield Drop Forging Co., Springfield, Mass.
Strieby & Foote Co., Newark, N. J.
Trense & Williams Co., Alliance, O.
Williams, J. H. & Co., Brooklyn, N. Y.
Wyman & Gordon, Worcester, Mass.
- Drop Hammers**
Billings & Spencer Co., Hartford, Conn.
Merrill Bros., Brooklyn, N. Y.
Williams, White & Co., Moline, Ill.
- Drop Presses**
Manville, F. J. Mch. Co., Waterbury, Ct.
Miner & Peck Mfg. Co., New Haven, Ct.
Mossberg & Granville Mfg. Co., Providence, R. I.
Vulcan Iron Works, Chicago, Ill.
- Dumb Waiters**
Energy Elevator Co., Philadelphia, Pa.
Speidel, J. G., Reading, Pa.
Storm Mfg. Co., Newark, N. J.
Variety Machine Co., Warsaw, N. Y.
- Dump Cars**
Atlas Bolt & Screw Co., Cleveland, O.
- Dynamoes**
Eddy Electric Mfg. Co., Windsor, Conn.
General Electric Co., Schenectady, N. Y.
Hanson & Van Winkle Co., Newark, N. J.
Stewart Electrical Co., Cincinnati, O.
Westinghouse Elec. & Mfg. Co., Pittsburgh, Pa.
Zucker & Levett & Loeb Co., 526-530 W. 25th St., New York.
- Eave Trough Hangers**
Reger Bros. Co., Philadelphia, Pa.
Heartley Mach. ne Variety Iron & Tool Works, Ltd., O.
Oatman Bros., Medina, O.
- Edge Tools**
Buck, Chas., Millbury, Mass.
Buck Bros. Millbury, Mass.
Ferro-Carbon Castings Co., Phila., Pa.
White, L. & I. J. Co., Buffalo, N. Y.
- Egg Beaters**
Lyons, Nelson, Albany, N. Y.
Standard Co., Boston, Mass.
Tadlin Mfg. Co., Forestville, Conn.
- Egg Opener**
Tittican, W. R., Collinsville, Ct.
- Electric Bells and Supplies**
Gastrander, W. R. & Co., 204 Fulton St.
- Electric Controllers**
Electric Controller & Supply Co., Cleveland, O.
- Electric Lighting and Power Apparatus**
Eddy Electric Mfg. Co., Windsor, Conn.
General Electric Co., Schenectady, N. Y.
- Electrical Apparatus**
Westinghouse Elec. & Mfg. Co., Pittsburgh, Pa.
- Electrical Machinery**
Stewart Electrical Co., Cincinnati, O.
- Electrotypes**
St. Louis Electrotypes Foundry, St. Louis, Mo.
- Elevators, Makers of**
Eastern Machinery Co., New Haven, Ct.
Energy Elevator Co., Philadelphia, Pa.
Link-Belt Engineering Co., Phila., Pa.
Morse, Williams & Co., Phila., Pa.
Ridgway, Craig & Son Co., Coatesville, Pa.
Spedel, J. G., Reading, Pa.
Variety Machine Co., Warsaw, N. Y.
Warner Elevator Mfg. Co., Cincinnati, O.
- Elevator Buckets**
Clark, W. J. & Co., Salem, O.
Cleveland Elevator Bucket Co., Cleveland, O.
- Elevator Enclosures and Cabs**
Ludlow Saylor Wire Co., St. Louis, Mo.
- Emery**
Tanite Co., Stroudsburg, Pa.
- Emery Wheels**
American Emery Wheel Works, Providence, R. I.
Best, L., 45 Vesey St., N. Y.
Bridgeport Safety Emery Wheel Co., Bridgeport, Conn.
Buffalo Emery Wheel Co., Buffalo, N. Y.
Diamond Mach. Co., Providence, R. I.
Nazel, John, Phila., Pa.
Northampton Emery Wheel Co., Leeds, Mass.
Norton Emery Wheel Co., Worcester, Mass.
Safety Emery Wheel Co., Springfield, O.
Springfield Mfg. Co., Bridgeport, Conn.
Sterling Emery Wheel Co., Tiffin, O.
Tanite Co., Stroudsburg, Pa.
Vittrified Emery Wheel Co., Westfield, Mass.
- Emery Wheel Dresser**
Chicago Screw Co., Chicago, Ill.
Dickinson, Thos. L., 45 Vesey St., N. Y.
- Engineers and Contractors**
Alken, Henry, Pittsburgh, Pa.
Erikson, Edw. E., Pittsburgh, Pa.
Filer & Sowell Co., Milwaukee, Wis.
Foster Miller Engineering Co., Pittsburgh, Pa.
Hevl & Patterson, Pittsburgh, Pa.
Huber, S. V. Co., Pittsburgh, Pa.
Kav. G. Ashton, 253 Broadway, N. Y.
Kennedy, Julian, Pittsburgh, Pa.
Leontis, Walter, Pittsburgh, Pa.
Lamond, David, Pittsburgh, Pa.
Laughlin, Alex. & Co., Pittsburgh, Pa.
- McClure, G. W. Son & Co., Pittsburgh**
Morgan Construction Co., Worcester, Mass.
Penna. Engineering Wks., New Castle, Penna.
Ritter-Conley Mfg. Co., Pittsburgh, Pa.
Smythe, S. K. Co., 118, Pittsburgh, Pa.
Swindell, W. & Bros., Pittsburgh, Pa.
Thompson, Hugh L., Waterbury, Ct.
Wellman Seaver Engineering Co., Cleveland, O.
- Engines**
Gas.
Mietz, Aug., 128-138 Mott St., N. Y.
Northern Engineering Works, Detroit, Mich.
Puger, J. W. Mfg. Co., Buffalo, N. Y.
Wooley Fdry. & Mch. Works, Anderson, Ind.
Gasoline.
Charter Gas Engine Co., Sterling, Ill.
Ruer, J. W. Mfg. Co., Buffalo, N. Y.
Weber Gas & Gasoline Engine Co., Kansas City, Mo.
Watkins, F. M., Cincinnati, O.
Wooley Fdry. & Mch. Works, Anderson, Ind.
Kerosene.
Mietz, Aug., 128-138 Mott St., N. Y.
Steam.
Allis, E. P. Co., Milwaukee, Wis.
Boston Blower Co., Hyde Park, Mass.
Buffalo Forge Co., Buffalo, N. Y.
Filer & Stowell Co., Milwaukee, Wis.
Newport News Shipbuilding & Dry Dock Co., 1 Broadway, N. Y.
Sennett Geo. B. Co., Youngstown, O.
Southwark Fdry. & Mch. Co., Philadelphia, Pa.
Sturtevant, B. F. Co., Boston, Mass.
Tod, William & Co., Youngstown, O.
Totten & Hogg Iron & Steel Fdry. Co., Pittsburgh, Pa.
Wetherill, Robt. & Co., Chester, Pa.
- Engines, Marine**
Lake City Engineering Co., Erie, Pa.
- Engines, Second Hand**
Everton, B. M., Pittsburgh, Pa.
- Engravers**
Mugford A., Hartford, Conn.
- Expanding Mandrels**
LeCount, Wm. G., So. Norwalk, Ct.
- Expansion Bolts**
Church, Isaac, Toledo, O.
McCabe Hanger Mfg. Co., 383-543 W. 2 St., N. Y.
Newhall Henry B. Co., N. Y.
Seaman, D. C. & Co., Philadelphia, Pa.
Steward & Romaine Mfg. Co., Phila., Pa.
- Farmers' Tools**
Champion Tool Co., Ltd., Conneaut Lake, Pa.
Heller Bros. & Co., Newark, N. J.
- Faucets**
Hitchfield, J. M., 105 Beekman St., N. Y.
McKenna Bros. Brass Co., Ltd., Pittsburgh, Pa.
- Faucets, Wooden**
Boston & Lockport Block Co., Boston.
Sommer's, John, Son, Newark, N. J.
- Feed Cutters**
Silver Mfg. Co., Salem, O.
- Feed Water Heaters and Purifiers**
Harrison Safety Boiler Works, Philadelphia, Pa.
Kelly, R. E. & Son, 91 Liberty St., N. Y.
National Pipe Bending Co., New Haven.
Patterson, F. L., 136 Liberty St., N. Y.
Taunton Locomotive Mfg. Co., Taunton, Mass.
Webster, Warren & Co., Camden, N. J.
Whitlock Oil Pipe Co., Hartford, Ct.
- Feeding Attachment**
National Machine Tool Co., Cincinnati, Ind.
- Fencing, Iron and Wire**
Adam, W. J., Joliet, Ill.
American Steel & Wire Co., Chicago, Ill.
Barnum, E. T., Detroit, Mich.
Burthe, A., Jersey City, N. J.
Clinton Wire Cloth Co., Clinton, Mass.
DeKalb Fence Co., DeKalb, Ill.
Dwiggins Wire Fence Co., Anderson, Ind.
Ellis & Halphenberger, Indianapolis, Ind.
Frost Wire Fence Co., Cleveland, O.
Gilbert & Bennett Mfg. Co., 44 Cliff St.
Hartman Mfg. Co., 399 Broadway, N. Y.
Kilmer Wire Mfg. Co., Chicago, Ill.
Kokomo Fence Mch. Co., Kokomo, Ind.
Ludlow Saylor Wire Co., St. Louis, Mo.
Ornamental Iron & Wire Co., Chattanooga, Tenn.
Rossman Woven Wire Fence Co., Rossman, N. Y.
Stewart Iron Works, Cincinnati, Ohio.
Up-to-date Mfg. Co., Terre Haute, Ind.
- Ferro-Chromium**
Willson Aluminum Co., 99 Cedar Street, N. Y.
- Files and Rasps**
Manufacturers of
Arcade File Works, Anderson, Ind.
Barnett, G. & H. Co., 41 & 43 Richmond Phila.
Diston, Henry & Sons, Inc., Phila., Pa.
Heller Bros. Co., Newark, N. J.
McCaffrey File Co., Philadelphia.
Nicholson File Co., Providence, R. I.
Stokes Bros. Mfg. Co., Freehold, N. J.
- Filing Cabinets**
Globe-Wernicke Co., Cincinnati, O.
- Filters**
Scaife, Wm. B. & Sons, Pittsburgh, Pa.
- Finished Castings**
Franklin, H. H. Mfg. Co., Syracuse.
- Fire Brick**
Borgner, Cyrus, Philadelphia, Pa.
Gardner Bros., Cumberland, Md.
Haws, W. H. Fire Brick Co., Mt. Union, Maurer, H. & Son, 421 E. 2nd, N. Y.
Ostrander Fire Brick Co., Troy, N. Y.
Potter & Lester, Toledo, O.
Presbrey Fire Brick Co., Taunton, Mass.
Valentine, M. D. & Bro. Co., Woodbridge.
- Fire Extinguishers**
International Sprinkler Co., Phila., Pa.

Fishing Tackle

Dane, Stoddard & Co., Boston, Mass.

Flexible Shafting

Chicago Flexible Shaft Co., Chicago, Ill.

Stow Flexible Shaft Co., Phila., Pa.

Stow Mfg. Co., Binghamton, N. Y.

Flint and Emery Paper

Baeder, Adamson & Co., Phila., Pa.

Floor and Ceiling Plates

Coddling Mfg. Co., Bristol, Conn.

Floor Hinge

Lawson Mfg. Co., Milwaukee, Wis.

Flue Cleaners

Jackson Flue Scraper Co., Jackson, N. Y.

Jarecki Mfg. Co., Erie, Pa.

Flv Killers

Bigelow, J. F., Worcester, Mass.

Fly Traps

Meyers, Fred. J. Mfg. Co., Hamilton, O.

Foot Power Emery Wheels

Buffalo Emery Wheel Co., Buffalo, N. Y.

Foot Rests

Star Heel Plate Co., Newark, N. J.

Forges, Portable, &c.

Bradley Co., Syracuse, N. Y.

Champion Blower & Forge Co., Lancaster, Pa.

Fairbanks Co., 311 Broadway, N. Y.

Sturtevant, B. F. Co., Boston, Mass.

Forgings, Iron and Steel

Baker, Jas. H. Mfg. Co., Pittsburgh, Pa.

Bethlehem Steel Co., S. Bethlehem, Pa.

Eastern Forge Co., Boston, Mass.

Frankford Steel Co., Phila., Pa.

Hay-Budden Mfg. Co., Brooklyn, N. Y.

Otis Steel Co., Ltd., Cleveland, Ohio.

Pittsburgh Shear, Knife & Machine Co., Pittsburgh, Pa.

Titusville Forge Co., Titusville, Pa.

U. S. Projectile Co., Brooklyn, N. Y.

Vulcanus Forging Co., Cleveland, O.

Forks, Hay and Manure

Continental Tool Co., Frankfort, N. Y.

Iowa Farming Tool Co., Ft. Madison, Ia.

Vithington & Cooley Mfg. Co., Jackson, N. Y.

Foundry Facings

Obermayer, S. Co., Cincinnati, O.

Foundry Lamps

Forest City Fdy. & Mfg. Co., Cleveland, Pa.

Paxson, J. W. Co., Phila., Pa.

Poinier & Lester, Toledo, O.

Four-Head Milling Machines

Ingersoll Milling Machine Co., Rockford, Ill.

Friction Clutches

Eastern Machinery Co., New Haven, Ct.

Hess, Snyder & Co., Massillon, O.

Furnaces, Foundry

Byram & Co., Detroit, Mich.

Furnaces, Oil, Gas and Coal

Rockwell Engineering Co., 26 Cortlandt St., N. Y.

Fuses

Ensign Blackford & Co., Simsbury, Ct.

Gages

Crosby Steam Gage & Valve Co., Boston.

Galvanized Ware

Keen & Hagerty Mfg. Co., Baltimore.

Galvanizing

Blackman & King, 801 Greenwich St., N. Y.

Cleveland Galvanizing Works, Cleveland, O.

Empire Pipe Rending & Supply Co., Brooklyn, N. Y.

Galvanizing Process

U. S. Electro Galvanizing Co., 348 Broadway, N. Y.

Garden Rakes

Cronk Hanger Co., Elmira, N. Y.

Jenkins Iron & Tool Co., Howard, Pa.

Garden Tools

Wichington & Cooley Mfg. Co., Jackson, N. Y.

Gas Compositometer

Uehling, Steinbart & Co., Ltd., Carlstadt, N. J.

Gas Compressors

Norwalk Iron Works Co., So. Norwalk, Conn.

Gas Furnaces

Am. Gas Furnace Co., 23 John St., N. Y.

Chicago Flexible Shaft Co., Chicago, Ill.

Gaskets, Iron

Smith & Co. Mfg. Co., Jersey City, N. J.

Gas Producers

Duff Patents Co., Allegheny, Pa.

Smythe, S. R. Co., Inc., Pittsburgh, Pa.

Swindell, W. & Bro., Pittsburgh, Pa.

Gas Stoves

Rehneke, Wilson Co., Pittsburgh, Pa.

Gauges, Rolling Mill

Haines Gauge Co., Philadelphia, Pa.

Gears

Boston Gear Works, Boston, Mass.

Buffalo Gear & Pattern Works, Buffalo, N. Y.

Gleason Tool Co., Rochester, N. Y.

Morse, Williams & Co., Phila., Pa.

Nuttall, R. D. Co., Pittsburgh, Pa.

Poole, Robt. Son & Co., Baltimore, Md.

Gears, Rawhide

Horsburgh & Scott, Cleveland, Ohio.

Gear Cutters

Becker Brainard Milling Machine Co., Hyde Park, Mass.

Gould & Eberhardt, Newark, N. J.

Whitton, D. E. Mch. Co., New London, Conn.

Gear Patterns

Buffalo Gear & Pattern Works, Buffalo, N. Y.

Generators, Electric

W. Stingham Elec. & Mfg. Co., Pittsburgh, Pa.

Glimers

No ton Mfg. Co., Chester, Conn.

Glass Cutters

Barrett, W. L., Bristol, Conn.

Buitman, F. H. & Co., Cleveland, O.

Monce, S. G., Unionville, Conn.

Smith & Hemenway Co., 296 Broadway, N. Y.

Glass Cutting Boards

Lufkin Rule Co., Saginaw, Mich.

Glue

Baeder, Adamson & Co., Phila., Pa.

Golf Goods

Bridgeport Gun Implement Co., 312 Broadway, N. Y.

Grates, Rocking

Sennett, Geo. B. Co., Youngstown, O.

Grease, Axle

Snow Flake Axle Grease Co., Boston.

Grinding and Polishing Mchs.

American Emery Wheel Works, Providence, R. I.

Barnes, V. F. & John Co., Rockford, Ill.

Besly, Chas. H. & Co., Chicago, Ill.

Brown & Sharpe Mfg. Co., Providence, R. I.

Cincinnati Milling Mach. Co., Cincinnati, O.

Diamond Mach. Co., Providence, R. I.

Landis Tool Co., Weymouth, Pa.

Northampton Emery Wheel Co., Leeds, Mass.

Norton Emery Wheel Co., Worcester, Mass.

Safety Emery Wheel Co., Springfield, O.

Springfield Mfg. Co., Bridgeport, Conn.

Taitte Co., Stroudsburg, Pa.

Universal Mach. Co., Providence, R. I.

Wilmarth & Morgan, Grand Rapids, Mich.

Grindstones

Cleveland Stone Co., Cleveland, O.

Grubbing Machine

New Century Mfg. Co., 43 E. 8th St., N. Y.

Guns

Harrington & Richardson Arms Co., Worcester, Mass.

Johnson, Iver Arms & Cycle Works, Fitchburg, Mass.

Marlin Fire Arms Co., New Haven, Ct.

Remington Arms Co., 315 Broadway, New York

Gun Implements

Union Hardware Co., Torrington, Conn.

Hack Saws

Disston, Henry & Sons, Inc., Phila., Pa.

Goodell-Prairie Co., Greenfield, Mass.

Springfield Machine Screw Co., Springfield, Mass.

Starrett, L. S. Co., Athol, Mass.

Hammers

Heller Bros. Co., Newark, N. J.

Logan & Strobbridge Iron Co., New Brighton, Pa.

Hammers, Pneumatic

Standard Pneumatic Tool Co., Chicago.

Hammocks

Palmer, L. E., Middletown, Conn.

Bicknell Hdw. Co., Janesville, Wis.

Hand Screws

Bliss, R. Mfg. Co., Pawtucket, R. I.

Handle Machinery

Defiance Machine Works, Defiance, O.

Hangers, Barn Door

Myers, F. E. & Bro., Ashland, O.

Hangers, Door

Chicago Spring Butt Co., Chicago, Ill.

Conura Trolley Track Mfg. Co., Holyoke, Mass.

Cronk Hanger Co., Elmira, N. Y.

Lane Bros., Poughkeepsie, N. Y.

Lawrence Bros., Sterling, Ill.

Louden Machinery Co., Fairfield, Iowa.

McCabe Hanger Mfg. Co., 533-543 W. 22d St., N. Y.

McKinney Mfg. Co., Allegheny, Pa.

New Mfg. Co., Canton, Ohio.

Stowell Mfg. & Foundry Co., So. Milwaukee, Wis.

Wilcox Mfg. Co., Aurora, Ill.

Hangers, Shafting

Ball Bearing Co., Boston, Mass.

Dodge Mfg. Co., Mishawaka, Ind.

Hardware Comm'n Merchants

Graham, Jno. H. & Co., 113 Chambers St., N. Y.

Hungerford, U. T., Brass & Copper Co., 121 Worth St., N. Y.

Hardware Manufacturers

Acme Mfg. Co., Freeport, Ill.

Central Hardware Co., Phila.

Logan & Strobbridge Iron Co., New Brighton, Pa.

Millers Falls Co., 23 Warren St., N. Y.

New Mfg. Co., Canton, Ohio.

Nicol & Co., Chicago, Ill.

Parker, Chas. Co., Meriden, Conn.

Peck, Stow & Wilcox Co., 27 Murray St., N. Y.

Southington Cutlery Co., Southington, Conn.

Stanley Works, New Britain, Conn.

Union Mfg. Co., 103 Chambers St., N. Y.

Van Wagoner & Williams Hdw. Co., Cleveland, O.

Wrightsville Hdw. Co., Wrightsville, Pa.

Hardware Mfrs.' Agents

Graham, John H. & Co., 113 Chambers St., N. Y.

Webbush & Hilger, Ltd., 9-15 Murray St., N. Y.

Hardware Shelving

Warren, J. D. Mfg. Co., Chicago, Ill.

Hardware Specialties

Acme Shear Co., Bridgeport, Conn.

Berger Bros. Co., Philadelphia, Pa.

Enterprise Mfg. Co., of Pa., Phila., Pa.

Graham, John H. & Co., 113 Chambers St., N. Y.

Pleuger & Henger Mfg. Co., St. Louis, Mo.

Scranton & Co., The, New Haven, Ct.

Smith & Egge Mfg. Co., Bridgeport, Ct.

Smith & Hemenway Co., 296 Broadway, N. Y.

Harness Snaps

Convent Mfg. Co., West Troy, N. Y.

Covert's Saddlery Wks., Farmer, N. Y.

Imperial Bit & Snap Co., Racine, Wis.

Hasps and Staples

McKinney Mfg. Co., Allegheny, Pa.

Hatchets

Jenkins Iron & Tool Co., Howard, Pa.

Hay Knives

Clark & Parsons Co., E. Wilton, Me.

Ney Mfg. Co., Canton, Ohio.

Hay Tools

Louden Machinery Co., Fairfield, Iowa.

Myers, F. E. & Bro., Ashland, O.

Ney Mfg. Co., Canton, O.

Heating and Ventilating Apparatus

American Blower Co., Detroit, Mich.

Bayley, Wm. & Sons Co., Milwaukee, Wis.

Boston Blower Co., Hyde Park, Mass.

Buffalo Forge Co., Buffalo, N. Y.

Perkins, B. F. & Son, Holyoke, Mass.

Sturtevant, B. F. Co., Boston, Mass.

Heel Plates

Star Heel Plate Co., Newark, N. J.

Hinges

Easy Spring Hinge Co., Shelby, O.

Jenkins Iron & Tool Co., Howard, Pa.

Lawrence Bros., Sterling, Ill.

McKinney Mfg. Co., Allegheny, Pa.

Stanley Works, New Britain, Conn.

Tiebout, W. & J., 113 Chambers St., N. Y.

Hitching Posts

Hartman Mfg. Co., 209 Broadway, N. Y.

Hoes, Garden, Planters', &c.

Continental Tool Co., Frankfort, N. Y.

Iowa Farming Tool Co., Fort Madison, Iowa.

Jenkins Iron & Tool Co., Howard, Pa.

Hoists, Air

Pedrick & Ayer Co., Philadelphia, Pa.

Ridgway, Craig & Son Co., Coatesville, Pa.

Hoists, Chain and Rope

Box, Alfred & Co., Philadelphia, Pa.

Eckstein, C. G., 249 Centre St., N. Y.

Fulton Iron & Engine Works, Detroit, Mich.

Harrington, E. Son & Co., Phila., Pa.

McCoy, Jos. F. & Co., 26 Warren St., Reading, Pa.

Speidel, J. G., Reading, Pa.

Hoisting Machines

Eastern Machinery Co., New Haven, Ct.

Lidgerwood Mfg. Co., 96 Liberty St., N. Y.

Hollow Mill

Geometric Drill Co., Westville, Conn.

Hollow Ware

Avery Stamping Co., Cleveland, Ohio.

Cleveland Stamping & Tool Co., Cleveland, O.

New York Stamping Co., Brooklyn, N. Y.

Rogers, Jno. M. Boat-Gauge & Drill Works, Gloucester, City, N. J.

Horse Nails

Capewell Horse Nail Co., Hartford, Ct.

Mooney, W. M. & Co., Ausable Chasm, N. Y.

National Horse Nail Co., Vergennes, Vt.

Putnam Nail Co., Neponset, Boston.

Webbush & Hilger, Ltd., 9-15 Murray St., N. Y.

Horse and Mule Shoes

American Steel & Wire Co., Chicago, Ill.

Burden Iron Co., Troy, N. Y.

Hollow Grip Horse Shoe Co., Chicago.

Phenix Horse Shoe Co., Poughkeepsie, N. Y.

Rhode Island Perkins Horse Shoe Co., Providence, R. I.

Hose

Boston Belting Co., Boston, Mass.

Peerless Rubber Mfg. Co., 16 Warren Street, New York.

Hose Couplings

Clark, W. J. & Co., Salem, Ohio.

Hose Coupling, Air

Pedrick & Ayer Co., Philadelphia, Pa.

Hose Washers

Canfield, H. O., Bridgeport, Conn.

House Furnishing Specialties

Lloyd Mfg. Co., Minneapolis, Minn.

American Tool Wks. Co., Cincinnati, O.
 Baird, U. Machinery Co., Pittsburgh, Pa.
 Barnes, W. F. & John Co., Rockford, Ill.
 Baush Mch. Tool Co., Springfield, Mass.
 Becker Brinard Milling Mach. Co., Hyde Park, Mass.
 Bliss E. W. Co., Brooklyn, N.Y.
 Bowler, Geo. H., Cleveland, O.
 Briggs, Marvin, 12 Broadway, N.Y.
 Brown & Sharpe Mfg. Co., Providence, R.I.
 Bullard Mch. Tool Co., Bridgeport, Ct.
 Carlin Machinery & Supply Co., Allegheny, Pa.
 Carlin's Sons Thos., Allegheny, Pa.
 Cincinnati Milling Mach. Co., Cin. O.
 Cincinnati Lancer Co., Cincinnati, O.
 Cincinnati Shaper Co., Cincinnati, O.
 Cook, T. W. G. & Co., 6 Reade St., N.Y.
 Cornell, J. B. & J. M., 26th St. and 11th Ave., New York City.
 Davis, W. P. Machine Co., Rochester, N.Y.
 Dawson, A. L. & Co., Chicago, Ill.
 Dawson & Goodwin, Chicago, Ill.
 Detrick & Harvey Mch. Co., Baltimore, Md.
 Diamond Drill & Mch. Co., Birdsboro, Pa.
 Down, J. B. & Co., Chicago, Ill.
 Draper Mach. Tool Co., Worcester, Mass.
 Du Bois Iron Works, Du Bois, Pa.
 Farrell & Dry & Mch. Co., Ansonia, Conn.
 Ferracute Machine Co., Bridgeport, N.J.
 Fish, H. C. Machine Works, Worcester, Mass.
 Garvin Machine Co., Spring and Varick Sts., N.Y.
 General Supply Co., 40 John St., N.Y.
 Geometric Drill Co., Westville, Conn.
 Gray, Robt. J., 32 1/2 E. 13th St., N.Y.
 Hanan & Finton, Springfield, Mass.
 Harris Mach. & Co., Minneapolis, Minn.
 Hendey Machine Co., Torrington, Conn.
 Hill, Henry F., Boston, Mass.
 Hill, Clarke & Co., Boston, Mass.
 Illinois Maintenance Co., Chicago, Ill.
 Johnson, Israel H., Jr., & Co., Phila.
 Johnson, Wm. C. & Sons Mch. Co., St. Louis, Mo.
 Kaiser, A. V. & Co., Phila., Pa.
 Keagy & Lear Mch. Co., Cohocton, O.
 Lodge & Shipley Mch. Tool Co., Cin., O.
 Lund, S. T., Boston, Mass.
 McCabe, J. J., 14 Day Street, N.Y.
 McDowell & Co., Pittsburg, Pa.
 McDowell Stocker & Co., Chicago.
 Machinists' Supply Co., Rochester, N.Y.
 Manning, Maxwell & Moore, 83-89 Liberty St., N.Y.
 Manville, E. J. Mach. Co., Waterbury, Ct.
 Marshall & Huchart Mch. Co., Chicago, Ill.
 Mossberg, Frank Co., Attleboro, Mass.
 National Machine & Co., Tiffin, Ohio.
 New Doty Mfg. Co., Janesville, Wis.
 New Haven Mfg. Co., New Haven, Conn.
 New York Machinery Depot, 173 Broadway, New York.
 Nile Tool Works Co., 138 Liberty St., N.Y.
 Nilson, A. H. Mch. Co., Bridgeport, Ct.
 Paradox Machinery Co., Chicago, Ill.
 Pennsylvania Machine Co., Phila., Pa.
 Phila. Machine Tool Co., Phila., Pa.
 Pittsburgh Mfg. Co., Pittsburgh, Pa.
 Pond Machine Tool Co., Plainfield, N.J.
 Poole, Robt. & Son Co., Baltimore, Md.
 Potter & Johnston Co., Pawtucket, R.I.
 Poulter & Co., Phila., Pa.
 Pratt & Whitney Co., Hartford, Conn.
 Prentiss Bros., Worcester, Mass.
 Prentiss Tool & Supply Co., 115 Liberty St., N.Y.
 Rainier & Williams, Chicago, Ill.
 Reade, Wm. A. & Co., Cleveland, O.
 Seyfert's Sons L. F., Philadelphia, Pa.
 Sigourney Tool Co., Hartford, Conn.
 Silk, Anderson Co., Cincinnati, Ohio.
 Standard Machinery & Equipment Co., Cleveland, O.
 Thomas & Lowe Machinery Co., Providence, R.I.
 Toomey, Frank, Philadelphia, Pa.
 Waterbury Farrel Foundry & Mch. Co., Waterbury, Conn.
 Wetherill Robert & Co., Chester, Pa.
 Windsor Machine Co., Windsor, Vt.
 Worner, C. M. Mch. Co., Detroit, Mich.
 York, S. C. Co., Cleveland, O.

Machinery, Wood Working
 DeLancey Machine Wks., DeLancey, O.
 Fay, J. A. & Egan Co., Cincinnati, O.

Machinery Springs
 Scott, Chas. Spring Co., Phila., Pa.

Machinery Builders
 Chapman, J. B. & Co., Springfield, Mass.
 U. S. Projectile Co., Brooklyn, N.Y.

Machine Knives
 Loyd, John O., 558-563 Water St., N.Y.

Machine Screws—See Screws, Machine

Machine Screw Work
 Spencer Automatic Mch. Screw Co., Hartford, Conn.

Machine Tools—See Machinery

Machine Wrenches
 Billings & Spencer Co., Hartford, Conn.

Machinists' Scales
 Starrett, L. S. Co., Athol, Mass.

Machinists' Tools and Supplies
 Billings & Spencer Co., Hartford, Conn.
 General Supply Co., 16 John St., N.Y.
 Kingston, J. M. Co., Buffalo, N.Y.
 King, J. M. Co., Waterford, N.Y.

Magnetic Separators
 Cresson, Geo. V. Co., Phila., Pa.

Manganese Bronze
 Hungerford, U. T. Brass & Copper Co., 121 Worth St., N.Y.

Manufacturing Properties
 Hilman, J. B. & Co., Pittsburgh, Pa.

Manufacturing Sites
 Chicago, Milwaukee & St. Paul R.R., Chicago, Ill.
 Louisville & Nashville R.R., Louisville, Ky.
 Southern Railway Co., Washington, D.C.

Measuring Machines
 Rogers, Jno. M. Box, Gauge & Drill Wks., Gloucester City, N.J.

Meat Choppers
 Brown, 160 Duane St., N.Y.
 Enterprise Mfg. Co. of Pa., Phila., Pa.
 Peck, Stow & Wilcox Co., 27 Murray St., New York.
 Streeter, N. R. & Co., Rochester, N.Y.
 Woodruff, O. D., Pottstown, Pa.

Metal Brokers
 American Metal Co., 52 Broadway, N.Y.

Metals
 Hendricks Bros., 49 Cliff St., N.Y.
 Hoteller, Theo. & Co., Buffalo, N.Y.
 Hungerford, U. T. Brass & Copper Co., 121 Worth St., N.Y.
 Rutter, A. T., 256 Broadway, N.Y.
 United Metals Selling Co., 11 Broadway, N.Y.

Metal Polish
 Hoffman, Geo. W., Indianapolis, Ind.

Metal Spinning
 Goodwin & Kintz Co., Winsted, Conn.

Metal Wheels
 Electric Wheel Co., Quincy, Ill.

Milling Machines
 Agassiz Co., Dubuque, Iowa.
 Becker-Brinard Milling Machine Co., Hyde Park, Mass.
 Brown & Sharpe Mfg. Co., Providence, R.I.
 Carter & Hake Mch. Co., Winsted, Conn.
 Cincinnati Milling Mach. Co., Cin., O.
 Fox Machine Co., Grand Rapids, Mich.
 Garvin Machine Co., Spring and Varick Sts., N.Y.
 Ingersoll Milling Mach. Co., Rockford, Ill.
 Nile Tool Works Co., 138-139 Liberty St., N.Y.
 Shuster, F. B. Co., New Haven, Conn.
 Thurston Mfg. Co., Providence, R.I.

Mining Knives
 Bishop, Geo. H. & Co., Cincinnati, O.
 Palmer Hdw. Mfg. Co., Troy, N.Y.

Mining Machinery
 Allis, E. P. Co., Milwaukee, Wis.
 Hand Drill Co., 128 Broadway, N.Y.

Mining Screens
 Harrington & King Perforating Co., Chicago, Ill.
 Howard & Morse, 45 Fulton St., N.Y.
 Michigan Wire Cloth Co., Detroit, Mich.

Miter Boxes
 Thomson Bros. & Co., Lowell, Mass.

Molding Machines
 Adams Co., Dubuque, Iowa.
 Maywood Fdry. & Mch. Co., Chicago.
 Primmore, Henry E., Chicago, Ill.

Motor Fans
 Hungerford, U. T. Brass & Copper Co., 121 Worth St., N.Y.

Motors, Air
 Stow Flexible Shaft Co., Phila., Pa.

Motors, Electric
 Eddy Electric Mfg. Co., Windsor, Conn.
 General Electric Co., Schenectady, N.Y.
 Stewart Electrical Co., Cincinnati, O.
 Sturtevant, B. F. Co., Boston, Mass.
 Westinghouse Elec. & Mfg. Co., Pittsburgh, Pa.

Nail Clippers
 Cook, H. C. Co., Ansonia, Conn.

Nail Machinery
 Pittsburgh Mfg. Co., Pittsburgh, Pa.

Nail Pullers
 Hagen & Reid, Troy, N.Y.
 Scrauton & Co., The New Haven, Conn.
 Snow, L. T., New Haven, Conn.

Name Plates, Machinery
 Murdoch Parlor Gate Co., Boston, Mass.

Natural Gas Pumps
 Norwalk Iron Wks. Co., So. Norwalk, Ct.

Nickel Platers' Supplies
 Eddy Electric Mfg. Co., Windsor, Conn.
 Hanson & Van Winkle Co., Newark, N.J.
 Zucker & Levett & Loeb Co., 25th St., New York.

Nickeloid
 American Nickeloid Co., Peru, Ill.

Norway Shapes
 Rowland, William & Harvey, Frankford, Philadelphia.

Nuts—See Bolts

Nuts, Self-Locking
 National Elastic Nut Co., Milwaukee, Wis.

Nut Machines
 Dunham Nut Co., Unionville, Conn.

Oil Burners
 Burns H. Gro-Carbon Burner Co., Fort Plain, N.Y.

Oil Burning Appliances
 Rockwell, Engineering Co., 26 Cortlandt St., N.Y.

Oil Extractor
 Reed & Curtis Mch. Screw Co., Worcester, Mass.

Oil Heaters—See Oil Stoves

Oil Stones
 P. W. Mfg. Co., Pike Station, N.H.

Oil Stoves—(See Stoves Oil, Vapor and Gasoline)

Oilers
 Key State Stamping Co., Worcester, Mass.
 Gem Mfg. Co., Pittsburgh, Pa.
 Hammer & Co., Branford, Conn.
 Stoutenburg Mfg. Co., Kefauver, Ill.
 Wilmot & Hobbs Mfg. Co., Bridgeport, Conn.

Oilless Bearings
 North American Metalline Co., Long Island City, N.Y.

Ore Breakers
 Aultman Co., Canton, O.
 Cresson, Geo. V. Co., Phila., Pa.

Ores
 Blair, Rea F. Co., Pittsburgh, Pa.
 Samuel, Frank, Philadelphia, Pa.
 Wister, Francis, Philadelphia, Pa.

Ovens, Portable
 Budgett, G. S. Co., Burlington, Vt.

Ox Shoes
 Seranton Forging Co., Seranton, Pa.
 Woodruff, Walter W. & Sons, Mt. Carmel, Conn.

Packing
 Boston Belting Co., Boston, Mass.
 Morrison, Robert, St. Louis, Mo.
 Peerless Rubber Mfg. Co., 16 Warren Street, N.Y.

Packing, Iron
 Smooth On Mfg. Co., Jersey City, N.J.

Padlocks
 Graham, John H. & Co., 113 Chambers Street, New York.

Paints
 Dixon, Jos. Crucible Co., Jersey City.

Pants Stretcher
 Covert Mfg. Co., West Troy, N.Y.

Patent Solicitors
 Goepel & Raegener, 290 Broadway, N.Y.
 Howson & Howson, Philadelphia and Washington.
 Stocking, E. B., Washington, D.C.

Patterns
 Balkwill Pattern Wks., Cleveland, O.
 Buffalo Gear & Pattern Works, Buffalo, N.Y.
 Norwalk Pattern & Mfg. Co., So. Norwalk, Conn.

Pattern Letters
 Butler, A. G., 103 Beckman St., N.Y.
 Cleveland Galvanizing Works, Cleveland, O.

Perforated Metal
 Clinton Wire Cloth Co., Clinton, Mass.
 Harrington & King Perforating Co., Chicago, Ill.
 Hungerford, U. T. Brass & Copper Co., 121 Worth St., N.Y.

Phosphor Bronze
 Hungerford, U. T. Brass & Copper Co., 121 Worth St., N.Y.
 Phosphor Bronze Smelting Co., Limited, Philadelphia.

Phosphor Tin
 Crescent Phosphorized Metal Co., Philadelphia, Pa.

Picture Wire
 Owsman Mills Co., Norwich, Conn.

Pig Casting Machines
 Heyl & Patterson, Pittsburgh, Pa.

Pig Iron
 Alabama Consolidated Coal & Iron Co., Birmingham, Ala.
 Bed, C. H. & Co., Phila., Pa.
 Cherry Valley Iron Co., Pittsburgh, Pa.
 Dimmick, J. K. & Co., Phila., Pa.
 Hickman, Williams & Co., Chicago, Ill.
 Houston, C. B. & Co., Philadelphia, Pa.
 Nicoll, B. & Co., 59-61 Wall St., N.Y.
 Republic Iron & Steel Co., Chicago.
 Samuel, Frank, Philadelphia, Pa.
 Sloan-Sheffield Steel & Iron Co., Birmingham, Ala.
 Snyder, W. P. & Co., Pittsburgh, Pa.
 Superior Charcoal Iron Co., Grand Rapids, Mich.
 Tennessee Coal, Iron & R.R. Co., Birmingham, Ala.
 Virginia Iron, Coal and Coke Co., Bristol, Va.—Tenn.

Pig Iron Analysis
 Church, S. K., San Francisco, Cal.

Pig Iron Storage
 Am. Pig Iron Storage Warrant Co., 4 Wall St., N.Y.

Pile Drivers
 Vulcan Iron Works, Chicago, Ill.

Pipe, Bent
 National Pipe Bending Co., New Haven, Conn.

Pipe Coupling
 Williams, J. H. & Co., Brooklyn, N.Y.

Pipe Crimpers
 Berridge Shear Co., Sturgis, Mich.

Pipe Cutting and Threading Machines
 Armstrong Mfg. Co., Bridgeport, Conn.
 Bigsell & Keeler Mfg. Co., Edwardsville, Ill.
 Curtis & Curtis, Bridgeport, Conn.
 Jarecki Mfg. Co., Erie, Pa.
 Merrill Mfg. Co., Toledo, O.
 Saunders' Sons, D., Yonkers, N.Y.

Pipe Grips
 Prentiss Vise Co., 44 Barclay, N.Y.

Pipes, Fittings, &c.
 Jarecki Mfg. Co., Erie, Pa.
 McNab & Harlin Mfg. Co., N.Y.

Pipe, Riveted Steel
 Pollock, W. B. Co., Youngstown, O.
 Scaife, Wm. B. & Sons, Pittsburgh.
 Warren City Boiler Works, Warren, O.

Pipe Snips
 Berridge Shear Co., Sturgis, Mich.

Pipe, Water and Gas
 Millar, C. & Son Co., Utica, N.Y.
 National Tube Co., Pittsburgh, Pa.
 Red Jacket Mfg. Co., Davenport, Iowa.
 U. S. Cast Iron Pipe & Foundry Co., Phila., Pa.
 Wood, R. D. & Co., Philadelphia, Pa.

Piston Rods, Tobin Bronze
 Ansonia Brass & Copper Co., 99 John St., N.Y.

Planes
 Stanley Rule & Level Co., N.Y.

Planers
 Amer. Tool Works Co., Cincinnati, O.
 Baird, U. Machinery Co., Pittsburgh, Pa.
 Belmer-Exams Tool Co., Cincinnati, O.
 Cincinnati Planer Co., Cincinnati, Ohio.
 Detrick & Harvey Mch. Co., Baltimore.
 Draper Mch. Tool Co., Worcester, Mass.
 Pond Machine Tool Co., Plainfield, N.J.
 Whitcomb Mfg. Co., Worcester, Mass.
 Wilson, W. A., Rochester, N.Y.

Plated Ware
 International Silver Co., Meriden, Ct.

Plates, Iron and Steel
 Jones & Laughlins, Ltd., Pittsburgh, Pa.
 Lukens Iron & Steel Co., Coatesville, Pa.
 Singer, Nimick & Co., Inc., Pittsburgh, Pa.
 Wood, Alan Co., Philadelphia.

Plate Iron Work
 Scaife, Wm. B. & Sons, Pittsburgh.

Pliers
 Bridgeport Mfg. Co., Bridgeport, Conn.
 Cronk Hanger Co., Elmira, N.Y.
 Utica Drop Forge & Tool Co., Utica, N.Y.

Pneumatic Tools
 Phila. Pneumatic Tool Co., Phila., Pa.
 Standard Pneumatic Tool Co., Chicago.

Pocket Knives
 Castanogus Cutlery Co., Little Valley, N.Y.

Polishing Wheels
 Divine Bros. Co., Utica, N.Y.

Portable Track
 Atlas Bolt & Screw Co., Cleveland, O.

Poultry Fencing
 DeKalb Fence Co., DeKalb, Ill.

Poultry Nettings
 Gilbert & Bennett Mfg. Co., 44 Cliff St., N.Y.
 N. J. Wire Cloth Co., Trenton, N.J.
 Tyler, W. S. Co., Cleveland, O.
 Wright & Colton Wire Cloth Co., Worcester, Mass.

Power Hack Saws
 Hoefer Mfg. Co., Freeport, Ill.

Power Hammers
 Beaudry & Co., Boston, Mass.
 Bradley Co., Syracuse, N.Y.
 Dieneit & Eisenhardt, Philadelphia.
 Dubuque Mch. Concern, Dubuque, Ia.
 Dupont Mfg. Co., St. Johnsbury, Vt.
 Hilbert-Freiberg Mch. Tool Co., Cincinnati, O.
 Kidder, R. E., Worcester, Mass.
 Miner & Peck Mfg. Co., New Haven, Ct.
 Scranton & Co., The New Haven, Conn.

Power Transmitting Mach'y
 Cresson, Geo. V. Co., Phila., Pa.
 Dodge Mfg. Co., Mishawaka, Ind.
 Norwalk Iron Wks. Co., So. Norwalk, Ct.

Pressed Metal Work
 Avery Stamping Co., Cleveland, Ohio.

Presses, Power
 Advance Mach. Works, Brooklyn, N.Y.
 Bliss, E. W. Co., Brooklyn, N.Y.
 Cook, T. W. G. & Co., 6 Reade St., N.Y.
 Cross & Speirs Mch. Co., Waterbury, Ct.
 Ferracute Mach. Co., Bridgeport, N.J.
 Hibbard, W. H., Brooklyn, N.Y.
 Hiles & Jones Co., Wilmington, Del.
 Keagy & Lear Mch. Co., Cohocton, O.
 Leffer, Chas. & Co., Brooklyn, N.Y.
 Manville, E. J. Mch. Co., Waterbury, Ct.
 Mossberg & Granville Mfg. Co., Providence, R.I.
 Niagara Machine & Tool Wks., Buffalo.
 Perkins Machine Co., Boston, Mass.
 Phila. Machine Tool Co., Phila., Pa.
 Rudolph & Krummel, Chicago, Ill.
 Shuster, F. B. Co., New Haven, Conn.

Projectiles
 National Tube Co., Pittsburgh, Pa.

Pulleys
 Amer. Pulley Co., Phila., Pa.
 Dodge Mfg. Co., Mishawaka, Ind.
 Eastern Machinery Co., New Haven, Ct.
 Evans, G. F., Boston, Mass.
 Hess, Snyder & Co., Massillon, O.
 Jones & Laughlins Ltd., Pittsburgh, Pa.
 Ohio Pulley Co., Marion, O.
 Saginaw Mfg. Co., Saginaw, Mich.
 Woods, T. B. Sons, Chambersburg, Pa.

Pump Chains
 Cleveland Galvanizing Works, Cleveland, Ohio.
 Garland Chain Co., Rankin Station, Pa.

Pumping Machinery
 Cook, A. D., Lawrenceburg, Ind.
 Filer & Stowell Co., Milwaukee, Wis.
 Ingersoll-Sergeant Drill Co., 36 Cortlandt St., N.Y.
 Lake City Engineering Co., Erie, Pa.
 McGowan, J. H. & Co., Cincinnati, O.
 Southward Fdry. & Mch. Co., Philadelphia, Pa.

Pumps
 Athol Pump Co., Athol, Mass.
 Barnes Mfg. Co., Mansfield, O.
 Deming Co., Salem, O.
 Edson Mfg. Co., Boston, Mass.
 Flint & Walling Co., Kendallville, Ind.
 Hess, Snyder & Co., Massillon, O.
 Humphreys Mfg. Co., Massfield, O.
 Myers, F. E. & Bro., Ashland, Ohio.
 Red Jacket Mfg. Co., Davenport, Ia.
 St. Joseph Pump & Mfg. Co., St. Joseph, Mo.
 Wilder, S. & Co., Holliston, Mass.

Punches, Conductors'
 Meyers, Fred. J. Mfg. Co., Hamilton, O.
 Woodman, H. Mfg. & Supply Co., Boston, Mass.

Punches and Shears, Hand and Power
 Bethlehem Foundry & Machine Co., So. Bethlehem, Pa.
 Bicknell Hdw. Co., Jacksonville, Wis.
 Bliss, E. W. Co., Brooklyn, N.Y.
 Hearty Machine Variety Iron & Tool Works, Toledo, Ohio.
 Hiles & Jones Co., Wilmington, Del.
 Mersick C. S. & Co., New Haven, Conn.
 New Doty Mfg. Co., Janesville, Wis.
 Williams, White & Co., Moline, Ill.

Punching and Shearing
 Harrington & King Perforating Co., Chicago, Ill.

Push Carts
 Syracuse Chilled Plow Co., Syracuse.

Pyrometers
 Gehling, Steinbart & Co., Ltd., Carlstadt, N.J.

Quotation Records
 Globe-Wernicke Co., Cincinnati, Ohio.

Railways, Industrial
 Hunt, C. W. Co., West New Brighton, N.Y.

Rat and Mouse Traps
 Abington Trap Co., Abington, Ill.
 Burditt & Williams, Boston, Mass.

Ratchet Drills
 Keystone Mfg. Co., Buffalo, N.Y.

Razors
 Buck Bros., Millbury, Mass.
 Kamppe Bros., 8-12 Reade St., N.Y.
 Southington Cutlery Co., Southington, Conn.

Razor Hones
 Pike Mfg. Co., Pike Station, N.H.

Reaming Stands
 Allen, D. H. & Co., Miamisburg, O.

Reamers
 Morse Twist Drill & Mch. Co., New Bedford, Mass.

Recording Gauges
 Bristol Co., Waterbury, Conn.
 Gehling, Steinbart & Co., Ltd., Carlstadt, N.J.

- Reels**
Hendryx, A. B. Co., New Haven, Conn.
- Refrigerating Machinery**
York Mfg. Co., York, Pa.
- Refrigerators**
Maine Mfg. Co., Nashua, N. H.
- Registers**
Seaver Mfg. Co., Boston, Mass.
Stowell Mfg. & Foundry Co., So. Milwaukee, Wis.
- Relaying Rails**
Donaldson & Newton, Phila., Pa.
Isaac Joseph Iron Co., Cincinnati, O.
May & Spalding, 32 Broadway, N. Y.
Steel Rail Supply Co., 100 B'way, N. Y.
- Reloading Tools**
Bridgeport Gun Implement Co., 313-315 Broadway, N. Y.
Hungerford, U. T., Brass & Copper Co., 121 Worth St., N. Y.
Ideal Mfg. Co., New Haven, Conn.
- Repairing Sets, Family**
Atchell, W. B., Chicago, Ill.
Schuyler, M. Sons & Co., Chicago, Ill.
Star Wheel Plate Co., Newark, N. J.
- Repairing Outfits, Farmers'**
Imperial Bit & Snap Co., Racine, Wis.
- Revolution Counters**
Pittkin, A. B. Machinery Co., Providence.
Taber Mfg. Co., Elizabeth, N. J.
- Revolvers**
Harrington & Richardson Arms Co., Worcester, Mass.
Johnson, Iver, Arms & Cycle Works, Fitchburg, Mass.
- Rheostats**
Electric Controller & Supply Co., Cleveland, O.
- Rifles**
Marlin Fire Arms Co., New Haven, Ct.
Remington Arms Co., 315 B'way, N. Y.
Stevens Arms & Tool Co., Chicopee Falls, Mass.
- Ring Rollers**
Shuster, F. B. Co., New Haven, Conn.
- Riveters**
Phila. Pneumatic Tool Co., Phila., Pa.
- Rivets**
American Iron & Steel Mfg. Co., Lebanon, Pa.
American Screw Co., Providence, R. I.
Blake & Johnson, Waterbury, Conn.
Burden Iron Co., Troy, N. Y.
Clark & Cowles, Plainville, Conn.
Cobb & Drew, Plymouth, Mass.
Garland Chain Co., Rankin Station, Pa.
Hungerford, U. T., Brass & Copper Co., 121 Worth St., N. Y.
Lanz, M. & Son, Pittsburgh, Pa.
McInnes, C. E. & Co., Phila., Pa.
Plymouth Mills, Plymouth, Mass.
Rockford Bolt Works, Rockford, Ill.
Townsend C. & E. P., New Brighton, Pa.
- Riveting Machines**
Bethlehem Foundry & Mch. Co., So. Bethlehem, Pa.
Shuster, F. B. Co., New Haven, Conn.
- Roll Mill Machinery**
Bradcock Machine & Mfg. Co., Brad-dock, Pa.
Morgan Construction Co., Worcester, Mass.
- Roll Turning Tools**
Trethewey, Sam'l & Co., Ltd., Pittsburgh
- Roller Bearings**
Ball Bearing Co., Boston, Mass.
Mossberg & Granville Mfg. Co., Providence, R. I.
- Rolling Mill Machinery**
Booth, The Lloyd Co., Youngstown, O.
Everson, B. M., Pittsburgh, Pa.
Farrell Fdry. & Mch. Co., Ansonia, Ct.
Frank Kneeland Mach. Co., Pittsburgh.
Garrison, A. Foundry Co., Pittsburgh.
Mesta Machine Co., Pittsburgh, Pa.
Morgan Construction Co., Worcester, Mass.
Mossberg & Granville Mfg. Co., Providence, R. I.
Penna. Engineering Wks., New Castle, Penna.
Totten & Hogg Iron & Steel Fdry. Co., Pittsburgh, Pa.
- Rolls, Chilled, Sand and Steel**
Brookham Iron Fdry., Derby, C. nn
Booth, The Lloyd Co., Youngstown, O.
Farrell Fdry. & Mch. Co., Ansonia, Ct.
Frank Kneeland Mach. Co., Pittsburgh.
Garrison, A. Fdry. Co., Pittsburgh, Pa.
Lorain Foundry Co., Lorain, Ohio.
Mesta Machine Co., Pittsburgh, Pa.
Phila. Roll & Mch. Co., Philadelphia, Pa.
Seaman, S. Mch. Co., Pittsburgh.
Totten & Hogg Iron and Steel Fdry. Co., Pittsburgh, Pa.
Youngstown Foundry & Machine Co., Youngstown, O.
- Roofing and Siding**
Asphalt Ready Roofing Co., 136 Water St., N. Y.
Garry Iron & Steel Roofing Co., Cleveland, O.
Scaife, W. M. B. & Sons, Pittsburgh.
Youngstown Iron & Steel Roofing Co., Youngstown, O.
- Rope and Cordage**
American Rope Co., 65 Wall St., N. Y.
Waterbury Rope Co., 69 South St., N. Y.
- Rope and Web Goods**
Covert Mfg. Co., West Troy, N. Y.
- Rope Shield**
Ironclad Co., Columbus, Ohio.
- Rope Transmission and Hoisting**
American Mfg. Co., 65 Wall St., N. Y.
California Wire Works, San Francisco.
Hunt, C. W. Co., West New Brighton, N. Y.
Leschen, A. & Sons, Rope Co., St. Louis.
Wood, T. B. Sons Chambersburg, Pa.
- Rubber Goods**
Boston Belting Co., Boston, Mass.
Canfield, H. O., Bridgeport, Conn.
Peerless Rubber Mfg. Co., 15 Warren Street, N. Y.
- Rubber Scrap**
Hofeller, Theo. & Co., Buffalo, N. Y.
- Rules**
Larkin Rule Co., Saginaw, Mich.
Stanley Rule & Level Co., 29 Chambers St., N. Y.
- Sad Irons**
Enterprise Mfg. Co., Phila., Pa.
Williams, A. C., Ravenna, O.
- Safety Razors**
Kampfe Bros., 8-12 Reade St., N. Y.
- Sand Blast Apparatus**
Ward, Edgar T. & Sons, Boston, Mass.
- Sand Paper**
Baeder, Adamson & Co., Phila., Pa.
- Sash Balances**
Caldwell Mfg. Co., Rochester, N. Y.
Pulman Sash Balance Co., Rochester, N. Y.
- Sash Cords and Chains**
Streeter, N. R. & Co., Rochester, N. Y.
- Sash Locks**
Fitch, W. & E. T. Co., The, New Haven, Conn.
- Sash Pulleys**
Fox Machine Co., Grand Rapids, Mich.
Grand Rapids Hardware Co., Grand Rapids, Mich.
Palmer Hardware Mfg. Co., Troy, N. Y.
- Sash Weights**
Barney & Reed Mfg. Co., Boston, Mass.
Brown, E. E. & Co., Philadelphia, Pa.
Enterprise Foundry Co., Cincinnati, O.
- Sausage Stuffers**
National Specialty Mfg. Co., Phila., Pa.
- Saws**
Atkins, E. C. & Co., Indianapolis, Ind.
Bishop, Geo. H. & Co., Cincinnati, Ohio.
Diston, Henry & Sons, Inc., Phila., Pa.
National Saw Co., Newark, N. J.
Simonds Mfg. Co., Fitchburg, Mass.
- Saw Clamps**
Diston, Henry & Sons, Inc., Phila., Pa.
- Saw Guides**
Thomson Bros. & Co., Lowell, Mass.
- Saw Handles**
Ladd, W. C., Bristol, Conn.
- Saw Sets**
Diston, Henry & Sons, Inc., Phila., Pa.
Taintor Mfg. Co., 9 to 15 Murray, N. Y.
- Saw Tools**
Atkins, E. C. & Co., Indianapolis, Ind.
- Scales**
Chattillon, John & Sons, 85-89 Cliff, N. Y.
Chicago Scale Co., Chicago, Ill.
Pelouse Scale & Mfg. Co., Chicago, Ill.
Standard Scale & Supply Co., Pittsburgh.
- Scrap Metals**
Armstrong, K. S. & Bro., Atlanta, Ga.
Blake, M. J. & M., 11th Ave. and 15th St., N. Y.
Botcher, C., Hoboken, N. J.
Greiner, F. & Co., Phila., Pa.
Hitner, H. A. & Sons, Phila., Pa.
Hofeller, Theo. & Co., Buffalo, N. Y.
Kennedy, L. E. & Co., 95 Liberty St., N. Y.
Leaf, E. B. & Co., Philadelphia, Pa.
Leonard, John & Co., 22 Broadway, N. Y.
Miles, E. & Co., Alban, Pa.
N. J. Iron & Metal Co., Paterson, N. J.
Phillips, F. R. & Sons Co., Phila., Pa.
Rogers, W. H., Bridgeport, Conn.
Samuels, M. Sons, Brooklyn, N. Y.
Smith, Morton B. Co., New York.
- Scrapers, Road**
American Steel Scraper Co., Sidney, O.
Aultman Co., Canton, Ohio.
Kilbourne & Jacobs Mfg. Co., Columbus, Ohio.
Sidney Steel Scraper Co., Sidney, O.
Syracuse Chilled Plow Co., Syracuse, N. Y.
- Screens, Window and Door**
Darrow, Edw. & Sons, Philadelphia, Pa.
- Screw Cutting Attachment**
National Machine Tool Co., Cincinnati.
- Screw Cutting Dies**
Card, S. W. Mfg. Co., Mansfield, Mass.
Geometric Drill Co., Westville, Conn.
Rogers, Jno. M. Boat Gauge & Drill Wks., Gloucester City, N. J.
Wells Bros. & Co., Greenfield, Mass.
Wiley & Russell Mfg. Co., Greenfield, Mass.
Winter Bros., Wrentham, Mass.
- Screw Drivers**
Braunsdorf-Mueller Co., Elizabeth, N. J.
Brown, R. H. & Co., New Haven, Conn.
Goodell-Pratt Co., Greenfield, Mass.
Mayhew, H. H. Co., Shelburne Falls, Mass.
New England Specialty Co., No. Easton, Mass.
North Bros. Mfg. Co., Philadelphia, Pa.
Sawyer Tool Co., Fitchburg, Mass.
Tower & Lyon, 95 Chambers St., N. Y.
Union Mfg. Co., Buffalo, N. Y.
- Screw Machine Products**
Dodge Machine Screw Co., Boston, Mass.
- Screw Machinery**
American Tool Wks. Co., Cincinnati, O.
Haker Bros., Toledo, O.
Brown & Sharpe Mfg. Co., Providence.
Draper Mach. Tool Co., Worcester, Mass.
Garvin Machine Co., Spring and Varick Sts., N. Y.
Jones & Lamson Men. Co., Springfield, Vt.
Windsor Mch. Co., Windsor, Vt.
- Screws**
Hall & Sam'l Sons, 229 West 10th St., N. Y.
Haskell, Wm. H. Mfg. Co., Pawtucket, R. I.
- Machine**
American Screw Co., Providence, R. I.
Blake & Johnson, Waterbury, Conn.
Chicago Screw Co., Chicago, Ill.
Haskell, Wm. H. Mfg. Co., Pawtucket.
Hubbell, Harvey, Bridgeport, Conn.
Illinois Screw Co., Chicago, Ill.
Miles, F. S., 235 Quarry, Philadelphia.
National Screw Co., Buffalo, N. Y.
Phila. Mach. Screw Works, Phila., Pa.
Pittsburgh Screw & Bolt Co., Pittsburgh, Pa.
Reel & Curtis Mch. Screw Co., Worcester, Mass.
Rhode Island Tool Co., Providence, R. I.
Southington Cutlery Co., Southington, Conn.
Worcester Mch. Screw Co., Worcester.
- Wood**
American Screw Co., Providence, R. I.
Franklin Moore Co., Winsted, Conn.
Reading Hardware Co., Reading, Pa.
Reading Screw Co., Norristown, Pa.
Southington Cutlery Co., Southington, Conn.
- Scroll Saws**
Barnes, W. F. & John Co., Rockford, Ill.
Millers Falls Co., 28 Warren St., N. Y.
Seneca Falls Mfg. Co., Seneca Falls, N. Y.
- Scythe Stones and Whetstones**
Cleveland Stone Co., Cleveland, O.
Pike Mfg. Co., Pike Station, N. H.
- Seamless Steel Tubes**
Ivins Ellwood, 487 Broadway, N. Y.
Raney, Steimetz & Co., Phila., Pa.
National Tube Co., Pittsburgh, Pa.
- Security Snaps**
Sundries Mfg. Co., South Bend, Ind.
- Set Screw Protectors**
Canfield, H. O., Bridgeport, Conn.
- Sewing Machines**
Demorest Mfg. Co., Williamsport, Pa.
National Sewing Machine Co., Belvidere, Ill.
- Shaft Coupling**
Fairbanks Co., 311 Broadway, N. Y.
Nicholson, W. H. & Co., Wilkes-Barre, Pa.
- Shafting**
Cresson, Geo. V. Co., Philadelphia, Pa.
Dodge Mfg. Co., Mishawaka, Ind.
Fairmount Mch. Co., Philadelphia, Pa.
Finished Steel Co., Youngstown, O.
Jones & Laughlins Co., Pittsburgh, Pa.
Pardee, J. Works, Perth Amboy, N. J.
Pittsburgh Steel Shafting Co., Rankin, Pa.
Stow Mfg. Co., Binghamton, N. Y.
Woods, T. B. Sons, Chambersburg, Pa.
- Shaped Iron and Steel**
Allentown Rolling Mill, Allentown, Pa.
American Steel Hoop Co., Battery Park Building, N. Y.
American Steel & Wire Co., Chicago, Ill.
Forest City Steel & Iron Co., Cleveland.
Lindsay, W. W. & Co., Phila., Pa.
Lockhart Iron & Steel Co., Pittsburgh, National Steel Co., Bridgeport, O.
Passaic Rolling Mill Co., Paterson, N. J.
Phoenix Iron Co., Phila., Pa.
Pittsburgh Steel Shafting Co., Rankin, Pa.
Kepublic Iron & Steel Co., Chicago, Ill.
- Shapers**
Barker-Charl Mach. Tool Co., Cincinnati, O.
Cincinnati Shaper Co., Cincinnati, O.
Gould & Eberhardt, Newark, N. J.
Perkin Machine Co., Boston, Mass.
Potter & Johnston Co., Pawtucket, R. I.
- Shear Knives**
Pittsburgh Shear, Knife & Machine Co., Pittsburgh, Pa.
Trethewey, Sam'l & Co., Ltd., Pittsburgh.
- Shears and Scissors**
Acme Shear Co., Bridgeport, Conn.
Bridgeport Mfg. Co., Bridgeport, Conn.
Cataugaus Cutlery Co., Little Valley, N. Y.
Heinrich's, R. Sons Co., Newark, N. J.
Jackson Knife & Shear Co., Fremont, O.
Lane Cutlery Works, Cedar Rapids, Ia.
National Cutlery Co., Phila., Pa.
Wiebusch & Hilger, Ltd., 9-15 Murray St., N. Y.
- Shears, Metal**
Carlin's, Thomas Sons Co., Allegheny, Pa.
- Sheet Bars**
National Steel Co., Battery Park Building, N. Y.
- Sheet and Bolt Copper**
Hungerford, U. T., Brass & Copper Co., 121 Worth St., N. Y.
- Sheet and Rolled Brass**
Hungerford, U. T., Brass & Copper Co., 121 Worth St., N. Y.
- Sheet Metal Machinery**
Adrian Mach. Works, Brooklyn, N. Y.
- Sheets, Galvanized**
American Sheet Steel Co., New York.
McCullough Iron Co., Wilmington, Del.
- Sheets, Iron and Steel**
American Sheet Steel Co., New York.
McCullough Iron Co., Wilmington, Del.
National Steel Co., Bridgeport, O.
Singer, Nimick & Co., Inc., Pittsburgh.
Wister, L. & R. Co., Philadelphia, Pa.
Alan Wood Co., Philadelphia.
- Sheet Zinc**
Illinois Zinc Co., Peru, Ill.
Mathiessen & Hegeler Zinc Co., La Salle, Ill.
- Shelf Boxes**
Heller Box Co., Montclair, N. J.
Moore, C. P., Ravenswood, W. Va.
- Shelf Ladders**
Bicycle Step Ladder Co., Chicago, Ill.
Coburn Trolley Track Mfg. Co., Holyoke, Mass.
Milbradt, G. A. & Co., St. Louis, Mo.
Morley Bros., Saginaw, Mich.
- Shelving**
Warren, J. D. Mfg. Co., Chicago, Ill.
- Shipbuilders**
Newport News Shipbuilding & Dry Dock Co., 1 Broadway, N. Y.
- Shovels, Spades and Scoops**
Continental Tool Co., Frankfort, N. Y.
St. Louis Shovel Co., St. Louis, Mo.
- Sinks**
Kilbourne & Jacobs Mfg. Co., Columbus, O.
- Skates, Ice**
Avery Stamping Co., Cleveland, O.
Dane, Stoddard & Co., Boston, Mass.
Union Hardware Co., Torrington, Conn.
- Skate Sharpeners**
Osborn Mfg. Co., Cleveland, O.
- Sprights**
Dronze, G. Co., Bridgeport, Conn.
- Reeving Works**
Reeves, Paul S., 793 S. Broad, Phila.
- Soapstone Goods**
Pike Mfg. Co., Pike Station, N. H.
- Soapstone Pencils**
Smith, D. M. Mfg. Co., Chattanooga, Tenn.
- Socket Wrenches**
Harris, Sam'l & Co., Chicago, Ill.
- Soldering Copper Handles**
Hungerford, U. T., Brass & Copper Co., 121 Worth St., N. Y.
- Soldering Coppers**
Hungerford, U. T., Brass & Copper Co., 121 Worth St., N. Y.
- Speaking Tubes**
Ostrander, W. R. & Co., 201 Fulton St., N. Y.
- Specialty Manufacturers**
Franklin H. H. Mfg. Co., Syracuse, N. Y.
Smith & Egge Mfg. Co., Bridgeport, Ct.
- Spelter**
Illinois Zinc Co., Peru, Ill.
Mathiessen & Hegeler Zinc Co., La Salle, Ill.
- Spelter Solder**
Hungerford, U. T., Brass & Copper Co., 121 Worth St., N. Y.
- Spikes**
American Iron & Steel Mfg. Co., Lebanon, Pa.
- Spoons and Forks**
International Silver Co., Meriden, Ct.
- Sporting Goods**
Dane, Stoddard & Co., Boston, Mass.
- Spray Pumps—(See Pumps)**
- Springs**
American Steel & Wire Co., Chicago, Ill.
Barnes, Wallace Co., Bristol, Conn.
Cary Spring Works, 240 W. 29th St., N. Y.
Chafflon, John & Sons, 85-89 Cliff St., New York.
Clark & Cowles, Plainville, Conn.
Dunbar Bros., Bristol, Conn.
Miller & Van Winkle, Brooklyn, N. Y.
Morgan Spring Co., Worcester, Mass.
Sabin Machine Co., Montpelier, Vt.
Scott, Chas. Spring Co., Phila., Pa.
Welch, T. F. Mfg. Co., Boston, Mass.
- Springs, Wagon, Etc.**
Wurster, F. W. & Co., Brooklyn, N. Y.
- Spring Cutters**
Brooks, M. S. & Sons, Chester, Conn.
Holinger Fence Co., Greenville, O.
- Spring Hinges**
Bonner Bros., Brooklyn, N. Y.
Chicago Spring Butt Co., Chicago, Ill.
Stover Mfg. Co., Freeport, Ill.
Van Wagoner & Williams Mch. Co., Cleveland, O.
- Sprocket Chain**
Buhl Malleable Co., Detroit, Mich.
- Spruce Cutters, Foot and Power**
Shuster, F. B. Co., New Haven, Conn.
- Stacks**
Scaife, Wm. B. & Sons, Pittsburgh.
- Stamped Ware**
Jenkinson, R. C. & Co., Newark, N. J.
Keen & Hagers, Mfg. Co., Baltimore.
New York Stamping Co., Brooklyn, N. Y.
- Stamping, Sheet Metal**
American Hdw. Mfg. Co., Ottawa, Ill.
American Railway Supply Co., 24 Park Place, N. Y.
American Steel Scraper Co., Sidney, O.
Cleveland Stamping & Tool Co., Cleveland, Ohio.
Davis & Burton Stamping Co., Worcester, Mass.
Goodwin & Kintz Co., Winsted, Conn.
Houghton & Buxton Mfg. Co., Worcester, Mass.
Jenkinson, R. C. & Co., Newark, N. J.
Konsiglow, E. & Bro., Cleveland, Ohio.
McKenna Bros. Brass Co., Ltd., Pittsburgh, Pa.
Mossberg, Frank Co., Attleboro, Mass.
Reed & Curtis Mch. Screw Co., Worcester, Mass.
Wheeling Hinge Co., Wheeling, W. Va.
Wilson & Smith, Worcester, Mass.
- Staple Machines, Automatic**
Shuster, F. B. Co., New Haven, Conn.
- Staples and Double Pointed Tacks**
Grand Crossing Tack Co., Grand Crossing, Ill.
Milwaukee Tack Co., Milwaukee, Wis.
Titchener, E. H. & Co., Binghamton, N. Y.
- Steam Cookers**
Peerless Cooker Co., Buffalo, N. Y.
- Steam Hammers**
Dienelt & Eisenhardt, Philadelphia.
Dudgeon, Richard, 24 Columbia St., N. Y.
Pittsburgh Shear Knife & Mach. Co., Pittsburgh, Pa.
Sellers, Wm. & Co., Inc., Phila., Pa.
- Steam Heating**
Webster, Warren & Co., Camden, N. J.
- Steam Separators**
Harrison Safety Boiler Wks., Phila., Pa.
Webster, Warren & Co., Camden.
- Steam Shovels**
The Automatic Shovel Co., Lorain, O.
- Steam Specialties**
Crosby Steam Gate & Valve Co., Boston.
Lunkenheimer Co., Cincinnati, O.
Massey Regulator Co., Boston, Mass.
- Steel Buildings**
American Bridge Co., East Berlin, Ct.
Boston Bridge Works, Boston, Mass.
New England Structural Co., Boston, Mass.
Ritter-Conley Mfg. Co., Pittsburgh, Pa.
Scaife, Wm. B. & Sons, Pittsburgh, Pa.
- Steel Chimneys**
Lindsay, W. W. & Co., Phila., Pa.
- Steel, Cold Rolled Strip**
Wilmet & Hobbs Mfg. Co., Bridgeport.
Wolf, R. H. & Co., Ltd., 118th Street and Harlem River, N. Y.
- Steel Forgings and Castings**
Bethlehem Steel Co., So. Bethlehem, Pa.
- Steel Hoops**
American Steel Hoop Co., Battery Park Building, N. Y.
- Steel Importers**
Hobson, Houghton & Co., 98 John St., N. Y.
Jesop, Wm. & Sons, Sheffield, England, or 91 John St., N. Y.
Milne, A. & Co., 1 Broadway, N. Y.
Wheelock, Lovejoy & Co., New York and Boston.
- Steel (Mushet's Special)**
Jones, B. M. & Co., Boston.
- Steel Manufacturers**
American Steel Hoop Co., Battery Park Building, N. Y.
American Steel & Wire Co., Chicago, Ill.
Baker, Hermann & Co., 103 Duane St., New York.
Braeburn Steel Co., Braeburn, Pa.
Canton Steel Co., Canton, Ohio.
Champion Iron & Steel Co., Muskegon, Mich.
Chester Steel Castings Co., Phila., Pa.
Chrome Steel Works, Brooklyn, N. Y.
Crescent Steel Co., Pittsburgh, Pa.
Frankford Steel Co., Philadelphia.
Hobson, Houghton & Co., 98 John St., N. Y.
Jesop, Wm. & Sons, Sheffield, England, or 91 John St., New York.
Jones & Laughlins, Ltd., Pittsburgh, Pa.
Kidd Bros. & Hunter Steel Wire Co., McKees Rocks, Pa.
La Belle Steel Co., Pittsburgh, Pa.
Lorain Steel Co., Lorain, Ohio.

- Lukens Iron & Steel Co.**, Coatesville, Pa.
Nash, Geo. & Co., Chicago.
National Steel Co., Battery Park Building, N. Y.
Newkirk, J. B. & Co., Philadelphia, Pa.
Otis Steel Co., Ltd., Cleveland, Ohio.
Republic Iron & Steel Co., Chicago, Ill.
Rowland, Wm. & Harvey, Frankford, Philadelphia.
Singer, Nimick & Co., Inc., Pittsburgh.
Wardlow, S. & C., Sheffield, England.
Willmot & Hobbs Mfg. Co., Bridgeport, Conn.
Manufacturers' Agents
Ogden & Wallace, 571-583 Greenwich St., New York.
Snyder, W. P. & Co., Pittsburgh, Pa.
Tennessee Coal, Iron & R. R. Co., Birmingham, Ala.
Virginia Iron, Coal and Coke Co., Bristol, Va.—Tenn.
- Steel, Self Hardening**
Denman & Davis, 85-87 John St., N. Y.
- Steel Rails**
Lorain Steel Co., Lorain, Ohio.
- Steel Stamps and Stencil Dies**
Eucker, L. A. Stamp Works, Little Ferry, N. J.
Ness, Geo. M., Jr., 61 Fulton St., N. Y.
Schwerdtle & Siebert, Bridgeport, Conn.
- Steel, Tool**
Brachman Steel Co., Braeburn, Pa.
Crescent Steel Co., Canton, Ohio.
Denman & Davis, 85-87 John St., N. Y.
Frankford Steel Co., Philadelphia, Pa.
Jesse, Wm. & Sons, Sheffield, England.
Jones, B. M. & Co., Boston, Mass.
La Belle Steel Co., Pittsburgh, Pa.
Nash, Geo. & Co., Chicago.
Singer, Nimick & Co., Pittsburgh, Pa.
- Step Ladders**
Handy Ladder Works, Cleveland, O.
- Step Ladders, Rolling**
Bicycle Step Ladder Co., Chicago, Ill.
Coburn Trolley Track Mfg. Co., Holbrook, Mass.
Milbradt, G. A. & Co., St. Louis, Mo.
Morley Bros., Saginaw, Mich.
- Stocks and Dies**
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Card, S. W. Mfg. Co., Mansfield, Mass.
Curtis & Curtis, Bridgeport, Conn.
Fairbanks Co., 311 Broadway, N. Y.
Hollands Mfg. Co., Erie, Pa.
Jones & Lamson Mch. Co., Springfield, Vt.
Jarecki Mfg. Co., Erie, Pa.
Oster Mfg. Co., Cleveland, Ohio.
Saunders' Sons, D., Yonkers, N. Y.
Wells Bros. & Co., Greenfield, Mass.
Wiley & Russell Mfg. Co., Greenfield.
Winter Bros., Wrentham, Mass.
- Stone Cutting Machinery**
Gilmour, J., Bennett Bldg., N. Y.
- Stone Working Machinery**
Patch, F. R. Mfg. Co., Rutland, Vt.
- Stop Screws**
Read, A. P. & Co., Chicago, Ill.
- Store Fixtures**
Warren, J. M. Mfg. Co., Chicago, Ill.
- Storm Window Fasteners**
Woodruff, W. W. & Sons, Mt. Carmel, Ct.
- Stove Linings**
Ostrander Fire Brick Co., Troy, N. Y.
- Stove Pipe Thimbles**
Cheney, S. & Son, Manila, N. Y.
- Stove Trucks**
Arcade Mfg. Co., Freeport, Ill.
- Stoves, Oil, Vapor and Gasoline**
Novelty Mfg. Co., Jackson, Mich.
Schneider & Trenkamp Co., Cleveland, Ohio.
- Straightening Machines, Wire and Sheet Metal**
Shuster, F. B. Co., New Haven, Conn.
- Structural Iron and Steel Work**
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Boston Bridge Works, Boston, Mass.
Du Bois Iron Works, Du Bois, Pa.
Eastern Bridge & Structural Co., Worcester, Mass.
Forest City Steel & Iron Co., Cleveland, Ohio.
Illinois Steel Co., Chicago, Ill.
Moseley Iron Bridge & Roof Co., 39 Cortland St., N. Y.
New England Structural Co., Boston, Mass.
Phoenix Iron Co., Philadelphia, Pa.
Ritter-Conley Mfg. Co., Pittsburgh, Pa.
Stewart Iron Works, Cincinnati, Ohio.
West Side Foundry Co., Troy, N. Y.
- Sulphuric Acid**
Mathiessen & Heiler Zinc Co., LaSalle, Ill.
- Swaging Machine**
Excelsior Needle Co., Torrington, Ct.
- Table Ware**
International Silver Co., Meriden, Ct.
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Grand Crossing Tack Co., Grand Crossing, Ill.
Milwaukee Tack Co., Milwaukee, Wis.
Plymouth Mills, Plymouth, Mass.
Ripley & Bartlett, Plymouth, Mass.
Shelton Co., Birmingham, Conn.
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Sweetzer, W. A., Brockton, Mass.
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Larkin Rule Co., Saginaw, Mich.
- Tap Holder**
Ideal Machine Works, Hartford, Conn.
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Hobell, Harvey, Bridgeport, Conn.
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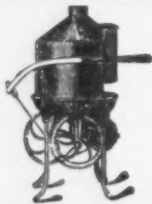
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